City Exhibit (ECB) 3.0

STATE OF ILLINOIS

ILLINOIS COMMERCE COMMISSION

COMMONWEALTH EDISON COMPANY	)	
	)	Docket No. 94-0065
Proposed General Increase in Rates	)	

PREPARED DIRECT TESTIMONY OF

EDWARD C. BODMER

on behalf of

CITY OF CHICAGO

June 2, 1994

City Exhibit ECB
Docket No. 94-0065

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On Behalf of
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I. QUALIFICATIONS

Q1. Please state your name and business address.

A. My name is Ed Bodmer. My business address is 205 North Michigan Avenue, Chicago, Illinois 60601.

Q2. Please summarize your educational background and relevant professional experience.

A. I received a B.S. degree (with highest honors) in Finance and Economics from the University of Illinois in 1979. I received my MBA degree, with honors, from the University of Chicago in 1986. My regulatory experience began with my employment on the Accounting and Finance Staff of the Illinois Commerce Commission, and has encompassed numerous assignments on regulatory issues as a consultant. Subsequently, I was a Vice President at the First National Bank of Chicago. In that position, I managed the credit analysis of all energy loans, which included transactions with electric and gas utility companies. I also directed a number of energy related financial advice projects for bank clients. In my current practice I have completed assignments for financial institutions, utility

companies, and government agencies in various areas, including industry restructuring, forecasting, pricing, resource planning and performance evaluation. I have testified before this and other Commissions on a wide variety of subjects, including cost-of-service.

II. OVERVIEW OF TESTIMONY

Q3. Please describe the scope and purpose of your testimony.

A. I was asked by the City of Chicago (1) to examine the cost of service study and rate design proposal presented by Edison in this case, supplementing the City's earlier investigation of Edison's cost study and rates, and (2) to present testimony on my findings.

My objectives have been to identify and to recommend appropriate changes to parts of Edison's cost-of-service study or rate design that I find inaccurate or not properly justified. I present an alternative residential rate design and I comment on certain aspects of Edison's non-residential rate design, including municipal street lighting rates. Finally, I comment on some impacts of Edison's proposal, and regional cost differences in Edison's service territory. As background, my testimony recounts some of the events leading to the current rate structure, provides a comparative context for assessing Edison's proposals, and evaluates

Edison's cost-of-service methodology. I also assess the equity and efficiency of Edison's rate structure, from the perspective of customers in the City of Chicago.

Q4. Are you familiar with Edison's costs of service and rate design from your previous work?

A. I have a general familiarity with the company from my work on the Commission Staff in the 1980's. More recently, in the context of several consulting assignments, I have analyzed Edison rate design and cost-of-service issues. Relevant projects have included analyses to support the City's franchise negotiations with Edison in 1990 and 1991, calculations and analysis supporting the City's rate design presentation in Docket No. 90-0169, and support of the City's efforts in the cooperative activities required by the franchise agreement between the City and Edison ("the cooperative process").

Q5. What did your analysis entail in preparing your testimony in this case?

A. I have reviewed Edison's filing in this docket and Edison's responses to the discovery of the City and other parties. I also have used information gained during my examination of Edison's cost-of-service study in the cooperative process. I have evaluated that information in the context of relevant economic theory and the regulatory principles of equity and efficiency. My recommendations and proposed rate design changes incorporate the results of that analysis, along with expert judgment based on my experience in cost analyses of electric utilities.

Q6. What are the main conclusions of your analysis?

A. My review has led me to the following principal conclusions:

1) Although Edison's marginal cost-of-service study is acceptable in most respects, it must be revised to correct the measurement of distribution capacity costs and the classification of customer costs.

2) Edison's proposed residential rate design is an improvement over its current design. However, the proposed rates are still inconsistent with Edison's own cost-of-service study, and the design does not satisfy relevant principles of efficiency and equity.

3) Edison's residential customers who use low or moderate amounts of electricity on a monthly basis pay more, relative to the cost of serving them, than residential customers who use large amounts of electricity. A comparison of Edison's rate structure with those of other utility companies, as well as over time, confirms that Edison's design is outside the mainstream -- tilted against customers who are efficient users or low users of electric energy.

4) A residential rate design that I have developed which maintains Edison's basic structure, but eliminates the current volume discount (that is not cost-justified) and moves summer rates closer to costs significantly improves the efficiency and equity of Edison's prices.

5) My alternative rate design aligns marginal costs and revenue recoveries for customers using either Edison's cost-of-service study or my adjusted cost-of-service measurements.

6) Edison's proposed increases to contract street lighting customers are not cost justified and should be modified. To eliminate the percentage of marginal cost disparity between rates for Edison's tariff street lighting customers (Rates 23 and 26) and its contract customers like the City, Edison should reduce rates fro contract customers by 5.4%.

7) Edison's rate design (for both residential and business customers) imposes higher rates on City customers as a group, in relation to their marginal costs of service, because of the characteristics that make City customers less costly to serve.

Q7. Why are these cost-of-service and rate design issues so important for the City?

A. In most respects, City customers are affected like all other Edison customers by rates which are designed well or poorly. As such, improvements in cost-of-service measurement or cost-based modifications to a rate design will increase the efficiency of Edison's prices and benefit all customers, including those who reside in the City. However, the City differs from other areas of Edison's service territory in a number of ways that, for City customers, exacerbate the effects of the particular rate design issues and cost study methodology which I discuss in this testimony.

City customers as a group have characteristics which lower Edison's costs of providing service in the City, including population density, housing stock, manufacturing base, and energy use patterns. For example:

- *Average energy usage per customer is significantly lower and energy use patterns are more efficient inside the City than outside the City, for residences and for businesses.* (The average monthly use for City residences is only 64% of the average usage outside the City; City business usage is 82% of outside City use; and, load factors are significantly higher in the City.)

- *Chicago has a relatively greater proportion of apartment dwellers, who tend to have usage patterns that are demonstrably more efficient and less costly to serve than single-family houses.* (Accounts for multi-family dwellings (i.e. apartments with three or more units) make up 54% of Edison's City residential accounts, but only 20% outside the City).

- *Population density in the City is far greater than it is outside the City* -- there are 4.88 customers per square mile in the City and .20 customers per mile outside the City.

- *The amount of distribution facilities (e.g., overhead and underground distribution cable) required per customer is significantly lower inside the City.* While the City represents 34% of Edison's customers, it has only 11% of Edison's overhead distribution lines and only 16% of Edison's underground cable.

Q8. Please outline the remainder of your testimony.

A. The organization of my testimony tracks my analysis of Edison's costs and rates. First, I review Edison's rate design from historical and national perspectives. I present a synopsis of the recent history of Edison's rate structure, and then

evaluate Edison's current and proposed rate designs in comparison with the rate structures of other utility companies.

Second, I describe the rather comprehensive investigation of Edison's costs and rates which began with the City's franchise negotiations, continued in a co-operative process under the franchise agreement, and culminated with my review of Edison's filing in this docket. This section begins by recounting the City's investigation and significant findings from that effort. Next, I present the City's cost-of-service analysis, and I address the allocation of differences between marginal costs and revenue requirements, which is necessary when setting prices using an equal proportion of marginal cost approach. (The more technical aspects of my cost-of-service analysis are included in a separate Technical Appendix.)

Third, I review the rate design Edison has proposed in this case. In particular, I consider how well cost-of-service differences at various usage levels are reflected in Edison's rates. On the basis of my findings, I recommend modifications in Edison's rate design that result in a more efficient and equitable rate structure.

Finally, I discuss several non-residential rates issues and regional differences in costs.

III. EDISON'S RESIDENTIAL RATE STRUCTURE

Q9. How have rates changed in the past for Edison customers who use relatively low amounts of electricity, as compared with customers who use high levels of electricity?

A. Over the past eleven years, residential rate design policies implemented by the Illinois Commerce Commission have raised rates disproportionately to Edison's residential customers who use relatively low amounts of electricity. Because of these policies (which have not necessarily been endorsed by Edison), and the resulting residential rate design, customers who use low and moderate amounts of electricity pay a significantly higher average rate per kWh than high-use residential customers -- a rate differential between small and large users that is much wider than those in other large metropolitan areas. Today, Edison's residential design imposes a significant burden on low income and low energy use customers which is not equitable or cost-justified.

Eighteen years ago, Edison had a relatively simple residential rate design with a minimal customer charge and a flat energy charge. In 1976, the customer charge was $1.30, and the energy charge was 4.473 cents per kWh for all seasons and levels of use. In the late 1970's the Commission began to use marginal cost-of-service to guide pricing, and in 1979 the Commission instituted, for the first time, a summer/winter rate differential. At its 1987 peak, the difference between

summer and non-summer energy charges was 88%. In 1984, the Commission eliminated the separate rate for space heating customers, implementing instead a steep declining block for all residential customers in the non-summer months. The declining block structure mitigated rate impacts for the approximately 7% of Edison's residential customers who are space heaters -- in this instance, "the tail wagged the dog."

When marginal cost pricing principles were first implemented, the Commission correctly recognized that customer charges do not fit in a marginal cost framework. Accordingly, it reduced and froze the monthly customer charge at $1.00. In subsequent cases, customer charges were moved closer to Edison's marginal cost type measurement of customer costs and the fixed monthly charge eventually rose to $11.24 per month for single family customers.

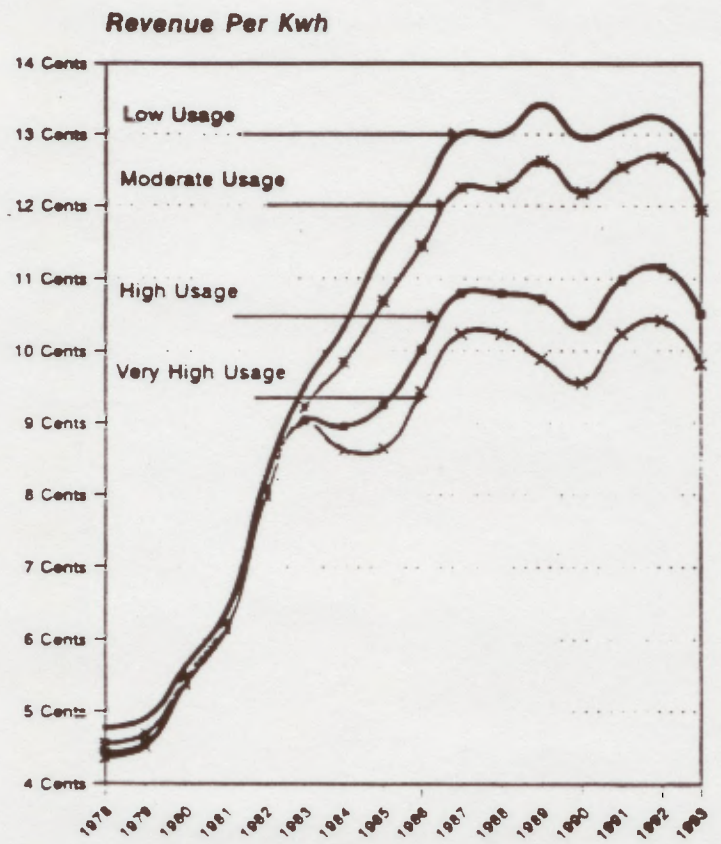
In Edison's last rate design case (90-0169), the Commission agreed to approve a cost justified space heating rate and to moderate Edison's very high customer charges. However, the declining block in non-summer months was not eliminated when the Commission re-instituted the separate space heating rate, despite the fact it was originally adopted to mitigate the loss of the space heating rate.

Q10. What effect did these rate structure changes have on the effective prices paid by residential users?

A. Implementation of the declining block for non-space heat customers along with a high customer charge created a large difference in average rates paid as between high use and low use customers. Figure 1 shows how Edison's rates for low use and high use residential customers have been affected by these changes.[1] The graph demonstrates that whereas there were minor differences between average rates for small and large usage customers in the early 1980's, the differential became very pronounced after 1983.

[1] In this illustration, low use customers are represented by energy use of 250 kWh per month in summer and non-summer months. The low use definition is based on the twenty-fifth percentile of Edison customers and includes ten percent of energy use. The low use profile is assumed to be characterized by 42% single-family residences and 58% multi-family residences. The moderate usage profile is defined by usage of 420 kWh per month in the summer and 400 kWh per month in the non-summer, which is Edison's 50th percentile in terms of number of customers and the 25th percentile in terms of energy usage. This group is assumed to consist of 54% single-family and 46% multi-family homes. High-use customers are represented by energy use of 700 kWh per month in the summer and 650 kWh per month in the non-summer representing the 80th percentile of customers and the 56th percentile of energy use. In this group, 88% of customers are assumed to be single-family. Very high users are defined to use 1,100 kWh in the summer and 900 kWh in the non-summer which is the 90th percentile of customer use and the 80th percentile of energy use. Ninety percent of these customers are assumed to be single family residences.

Figure 1
Trends in Edison Residential Rates



Q11. How do Edison's residential rates compare to the rates of other utility companies serving large metropolitan areas?

A. In Figure 2, I compare Edison's average rates for groups of residential customers with the average of the rates for the same customer groups in the nation's six other largest metropolitan areas (according to the 1990 census). The graph in Figure 2 shows the percentages by which Edison's current and proposed rates are

above or below the six-city average at various usage levels. I compare Edison's rates to rates charged by utility companies in other large metropolitan areas, because these utilities share many characteristics, such as housing types, energy usage patterns, and population diversity, that produce distinctive cost-of- service and customer impacts.

Figure 2
Edison Bills Compared to Other Large Cities

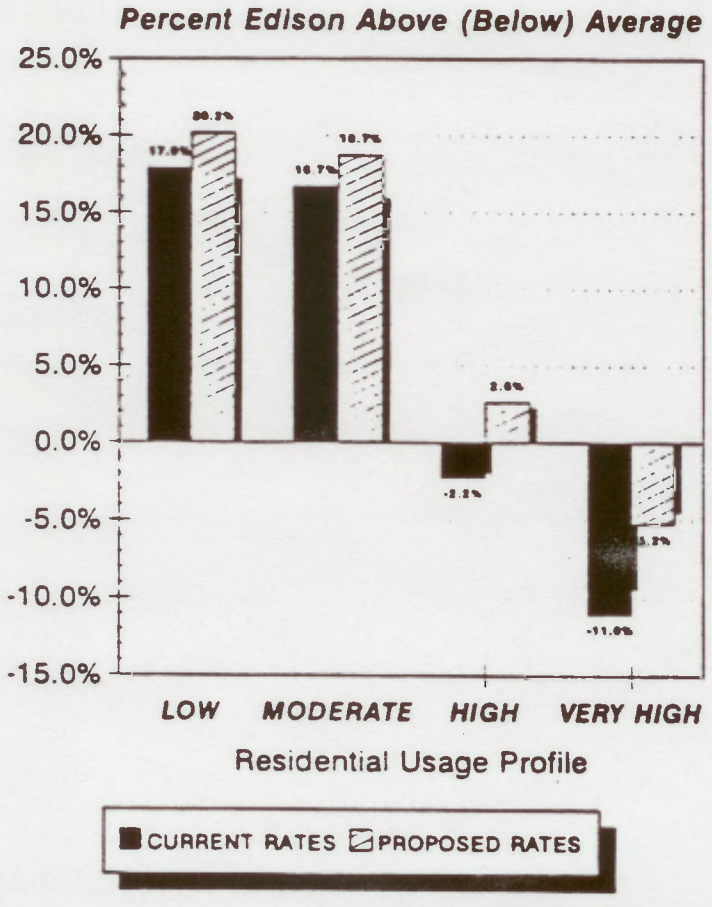


Figure 2 demonstrates that Edison's residential rate design is very different from that of the metropolitan composite. At low customer usage levels, Edison's rates (current and proposed) are much higher than the six-city average. However, at very high usage levels the current Edison rates are actually lower than average. Edison's proposed rates slightly mitigate the disparity, but still maintain a very substantial relative discount for heavy users. Rates for customers with low usage are 17.9% above the six-city average; rates for moderate usage are 16.7% above the average; rates for high energy use customers are 2.2% below average; and, rates for very high users are 11% below average. The customer profiles correspond to those defined in footnote 1 on page 10.

Q12. Edison's witness, Mr. Bukovski, made a comparison in which Edison's rates seemed to be rather ordinary. Why are your comparisons different?

A. As I noted earlier, my focus in this testimony is residential rates. Mr. Bukovski's rate comparison (Edison Exh. 1.2) was for 1992 total revenue per kWh to all retail customers. Comparison of averaged rates across customer classes, however, conceals the disparity in residential rate levels at various usage levels. In my comparison shown above in Figure 2 (Edison against the seven other largest cities), Edison's rates for the heaviest residential electric users are below the average, even though its rates for customers with low usage are significantly above the average. (In a similar sample of the top ten and fifteen cities, Edison's

proposed rates are higher than the average at all levels of usage, but there is a similar disparity between rates for low use and high use customers).

Q13. Why are Edison's rates tilted relative to the utility companies which serve other large cities?

A. Although Edison's nominal rates are the same across most usage levels (i.e. a low use customer does not have a different tariff than a high use customer), several specific features of its rate design combine to yield effective rates -- the actual prices to customers when all charges are taken into account -- that decrease significantly with increasing usage. Specifically, those features are:

(1) Edison's relatively high customer charge;

(2) Edison's declining block in non-summer months -- a volume discount which does not exist for most of the other utility companies; and,

(3) Edison's lack of higher energy charges for high use in the its summer peak period (i.e., an inverted energy charge).

As I explain later in my testimony, Edison's residential rate structure is not cost justified on a residential intra-class (i.e., usage level) basis. In particular, the three features responsible for the unusual rate impacts shown in the above graph are not supported by Edison's cost-of-service information. The customer charge to existing customers should reflect only on-going marginal customer costs; Edison's cost-of-service study provides no basis for volume discounts; and, Edison's load

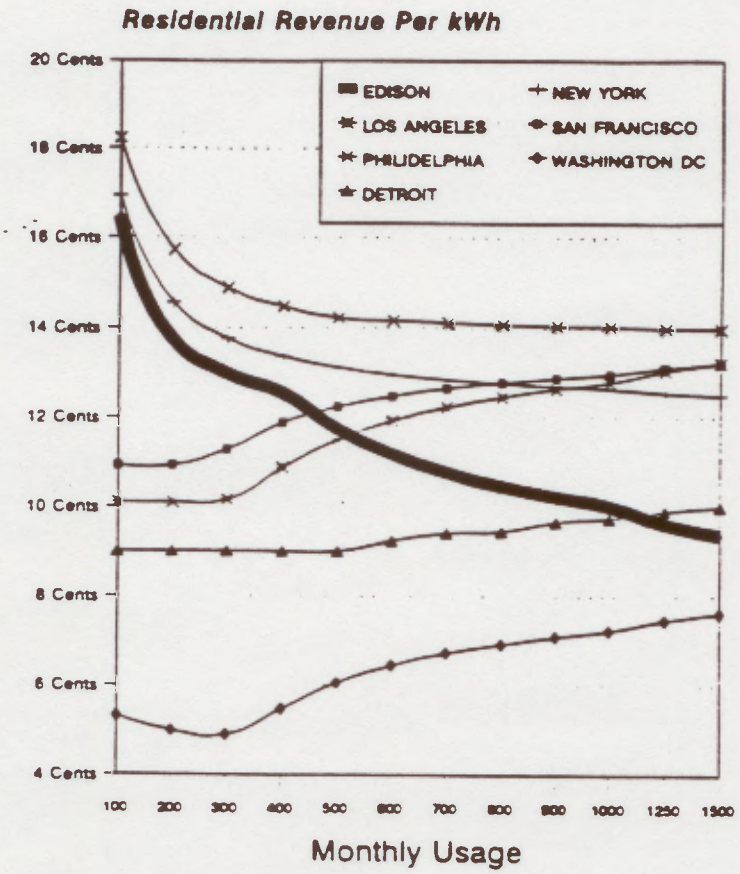
research demonstrates that in Edison's summer peak period, an inverted energy charge[2] would match rates with costs.

Q14. How does Edison's residential rate design compare to the rate design of individual utility companies serving large metropolitan areas?

A. Figure 3 shows the current average rates (total bill divided by kWh usage) for different levels of residential usage in the Edison system compared with the six other largest metropolitan areas in the U.S. The solid black line shows Edison's rates at usage levels between 200 kWh and 1,500 kWh per month. The individual line plots show the average rates charged by utility companies in other large metropolitan areas. The graph clearly demonstrates that Edison's residential rate structure is out of the mainstream in terms of its declining slope across usage levels.

[2] An inverted energy charge is a rate which increases for usage above a certain level.

Figure 3
Edison Structure as Compared to Other Cities



IV. THE CITY'S REVIEW OF EDISON'S COST STUDY

Q15. Earlier you mentioned that your review of Edison's costs and rates began with the City's franchise activities. How did a cost study come out of those activities?

A. Negotiating a new franchise agreement with Edison prompted the City to review various aspects of Edison's operations in the City, including its rate design. In that analysis, the City recognized that Edison's residential rate design imposed disparate burdens on residential customers who use low and moderate amounts of electricity, a customer characteristic common in the City of Chicago. This effect was at odds with efficiency and conservation initiatives that could reduce customer bills.

Ultimately, the City and Edison agreed that they would jointly review Edison's cost study and rate design, with the aim of conforming the residential rate structure to costs of service. Cost based rates increase the efficiency and equity of Edison's rate structure for all customers and, because of usage patterns in the City, have a special beneficial effect for Edison's Chicago customers in comparison with Edison's current rates.[3]

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[3] The City of Chicago's franchise agreement objectives were summarized by Bob Helman, lead negotiator for the City of Chicago: "Now, as you know, although this discussion of rates is often cast in terms of providing rate relief for poor people and for senior citizens on fixed incomes, as a matter of law that really cannot be done without 'unreasonable discrimination,' as it's called. There's a rule in the utility law field that customer have to be treated in an even-handed way. And discriminating on the basis of income or age is not regarded, under the law at present, as being sufficiently even-handed. So we had to focus instead on rate relief for smaller customers which would include, by definition, poorer people and people on fixed incomes, retired people. But the City's position could not be aimed at those people exclusively. So, as I have said to you before, if you were a yuppie banker with a studio apartment on Lake Shore Drive, you would get the same benefit as someone who was on a very small fixed income trying to pay their bills in a small apartment as well. That's just the way it is. . . . . Under the new franchise, we also have then committed to the preparation of a cost of service study which shows how much it costs to serve each class of customer and each general size of customer within a class. They will share those results with the City of Chicago, and if the City believes that the cost of service is too high for this group that we are trying to help -- which really amounted to about half the people in the City of Chicago -- and if Edison doesn't do anything voluntarily to reduce the rates for those customers, the City would be able to take those studies to the Illinois Commerce Commission and seek rate relief for those customers." Testimony of Robert A. Helman before the City Council Committee on Energy, Environmental Protection and Public Utilities, November 18, 1991.

Q16. What did that investigation entail?

A. Pursuant to the terms of the agreement between the parties on this issue, the City and Edison held a number of meetings and exchanged information on topics related to Edison's marginal cost-of-service study. Subjects we addressed included load research, distribution cost analysis, customer cost theory and rate design. I understand that, in part based on the co-operative study, Edison is in the process of revising its distribution cost calculations.[4]

The joint process with Edison yielded a productive exchange of data and ideas between Edison and the City. However, a comprehensive study addressing all of the methodological issues the City presented to Edison was not performed by Edison before Edison filed this rate case. The analysis presented in my testimony is based principally on the City's own analysis, some of which was reviewed and accepted by Edison in that joint process.

Q17. What were some of the issues that the City presented to Edison in that context?

A. We began by preparing and submitting to Edison a paper on the economic and regulatory principles that should guide its rate design process, along with some suggestions for refining its cost-of-service methodology. Principles of efficiency and equity are, in my opinion, the fundamental guides for many regulatory policies, including rate design. These two principles require that rates should be designed

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[4] Edison has acknowledged that it will make changes in its cost study to reclassify certain customer load from high to medium density categories. (Edison response to Staff data request RD-5.) These changes moderate but do not eliminate the effects of practices questioned by the City during its review.

in a manner that (1) promotes efficient usage of electricity and (2) is fair and impartial to subgroups of customers. By setting rates according to cost-of-service, resources will be efficiently allocated between electric power and other goods and services in the economy. Equity or fairness dictates that particular groups of customers should not be disproportionately favored or harmed.

Q18. Was consistency with those principles the focus of your review of Edison's cost-of-service methodology?

A. Yes. The City performed a careful analysis of Edison's marginal cost-of-service study using these principles as a guide. In the joint review pursuant to the franchise, and following Edison's filing in this case, I examined the following areas.

(1) Economic Theory: We reviewed the general concept of basing electricity rate design on marginal cost.

(2) Marginal Cost Concepts: We evaluated the theoretical underpinnings of Edison's computation of marginal energy costs, marginal capacity costs and marginal customer costs.

(3) Load Research: We analyzed Edison's residential load research data through a statistical analysis of peak demand and energy usage for different types of customers in the residential class.

(4) Distribution Capacity Cost: We examined Edison's marginal distribution cost study by reviewing the methodology used to define representative customers, the survey used to estimate quantities of required distribution equipment, the characteristics of the areas defined as light, medium and heavy density, and the costs of installing new distribution equipment.

(5) Marginal Customer Cost: We researched Edison's marginal customer cost calculations, analyzing conceptual cost allocation issues for new customer installations and for on-going customer related activities, and we examined Edison's inclusion of bad debt costs as a component of customer costs.

(6) Marginal Cost Recoveries: We quantified the ratio of revenue recovery to marginal cost for various groups within the residential class, using billing distribution data provided by Edison.

(7) Cost-of-Service Classification By Usage: We have classified Edison's costs of service by usage level for the residential class using billing distribution data, load research statistics, marginal cost analysis, and Edison's plant report.

From my involvement in the joint process I have concluded that the Company's cost-of-service study should be improved in several important respects. My review of Edison's filing established that the same modifications are still appropriate. While I believe it is crucial to make the corrections to Edison's cost-of-service described below, I emphasize that the alternative rate design which I have created is cost justified from the perspective of both Edison's current cost study and my improved study.

Q19. What aspects of Edison's cost-of-service study should be improved?

A. Customer Costs. First, Edison's measurement of marginal customer costs should segregate installation costs attributable to customers who construct new residences or business from the recurring variable costs caused by existing customers. Second, Edison's bad debt expenses should not be artificially related to the number of customers in a class. The effects of these changes is to reduce

single-family customer costs from $10.75 to $6.67 per customer and to reduce multi-family customer costs from $8.33 to $5.17 per customer.

Distribution Costs. Edison's distribution capacity costs must be changed so that they accurately reflect the long-run marginal costs of serving customers in differing density areas which means distribution capacity costs should be decreased by $300/KW for urban customers and increased by $92/KW for suburban customers. The portion of multi-family customers' marginal distribution costs that is related to class loads should be revised to reflect this subgroup's peak load characteristics.

Usage Level Subgroups. Finally, Edison's marginal cost presentation should be formulated in a manner which recognizes that its costs vary significantly according to usage level within the residential class.

Q20. Could you describe the specific findings of your review of Edison's cost of service study that support the changes you recommend?

A. Yes. My Technical Appendix provides details of my review of Edison's marginal production capacity and energy costs, marginal transmission capacity costs, marginal distribution capacity costs and marginal customer costs from a theoretical perspective. In the Technical Appendix, I also present more specifics on my five proposed changes to Edison's cost-of-service approach.

Q21. Summarize the portion of your Technical Appendix relating to Edison's customer charge?

A. My recommended change to Edison's customer cost classification is derived from the simple and fundamental marginal cost principle that marginal costs must be linked to the consumption activity that gives rise to the cost. Edison's costs for installing new meters is driven by construction of new homes and businesses and its marginal cost study should recognize this fact. In the Technical Appendix I explain that in addition to being inconsistent with marginal cost principles, assigning installation costs to existing customers is inconsistent with competitive market pricing models and leads to distorted pricing signals. Furthermore, I describe why assigning costs for meters and service drops to new customers is appropriate, but is not for other Edison cost elements.

I also recommend that Edison's bad debts expense be removed from its calculation of marginal customer costs. The Technical Appendix describes why bad debt expenses are not marginal costs linked to the consumption of customers who do pay their bills and that classifying bad debt expenses as customer costs can be very inequitable for customers who use low amounts of energy. I also

demonstrate that Edison's assignment of its bad debt expenses to the customer cost on the basis of a regression analysis is irrelevant.[5]

Q22. What were your findings regarding Edison's quantification of marginal distribution costs?

A. I have found that Edison's marginal cost-of-service study does not correspond to the actual quantities of facilities used for various density classes of residential customers. My analysis in the Technical Appendix demonstrates by the use of actual plant records that Edison's study overestimates the amount of expensive underground cable required to serve urban customers by more than 300% and that Edison understates the total quantity of distribution wires required to serve suburban customers by 50%.[6] The absurdity of the study's assumption that of 74% urban underground distribution plant is demonstrated by simply traveling around Chicago, as well as by Edison's own plant records.

Q23. You have mentioned previously an adjustment that Edison plans to make to distribution costs. Is your adjustment the same as the Company's?

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[5] For bad debt expenses, I do not challenge Edison's assignment of costs to each class, although strict adherence to marginal cost theory would not permit such an arguably arbitrary assignment of costs. In a pragmatic compromise (because of the contentious nature of interclass allocation) I do not oppose the assignment of a class' bad debt expenses to the class. However, at that point, bad debt costs should be distributed within the class on the basis of overall marginal costs, not on the basis of artificial relationships.

[6] This error was apparently the result of a decade old survey, which asked a sample of Edison plant engineers to estimate representative customer facility requirements, but had ambiguous instructions.

A. No, it is not. Edison has recognized that its measurement of distribution capacity costs does not reflect actual urban residential area characteristics and the company has transferred some of its customers from the high density category to a lower density category to make up for the error. However, Edison's original definition of a heavy density area was based on the Chicago Loop, which contains very few residential customers (0.4% of City residential customers). Since Edison's high density represents such a small segment of its customer base, it should not be used for any residential cost determinations. My adjustment seeks to correct the error directly by reflecting actual facility configurations in urban residential areas.

Q24. Did you find any other adjustments to Edison's measurement of marginal distribution capacity costs to be appropriate?

A. Yes. I also found that the assumption which Edison uses to allocate costs of new secondary distribution facilities is not reasonable on a subclass basis in the residential class. Specifically, for the multi-family subclass, applying secondary distribution costs using the class non-coincident peak load overstates costs attributable to the subclass, because of the difference between coincident and non-coincident loads for multi-family customers.

Q25. What is the total effect of your cost adjustments?

A. City Exhibit ECB-3 demonstrates that the overall impact of my recommended changes is to reduce total marginal costs to the multi-family residential subclass by 17.4% and to reduce marginal cost for the single family subclass by 2.8%. Marginal cost for the residential class as a whole is reduced by 4.4%. The adjustments for customer costs and distribution costs have some ripple effect through other parts of Edison's cost-of-service study. In City Exhibits ECB-1 to ECB-3, I reflect those derivative effects. In City Exhibit ECB-4, I summarize Edison's costs as differentiated by usage level.

My analysis of Edison's marginal costs presented in City Exhibit ECB-4 demonstrates that low energy use customers incur more of Edison's costs relative to revenue recovery. Table 1, which is derived from City Exhibit ECB-4, compares revenues recovered with marginal cost-of-service split into three levels of average monthly usage for non-space-heating customers. The table demonstrates that Edison currently recovers 31% more, relative to cost-of-service, from low use customers as compared with high use customers.

TABLE 1
RESIDENTIAL COST-OF-SERVICE RECOVERY
BY USAGE LEVEL

Category of Residential Usage	Percent of Customers	Revenue Recovery as Percent of Marginal Cost
Low Use (Below 300 kWh/Month)	36%	137%
Moderate Use (301-550 kWh/Month)	33%	131%
High Use (Above 550 kWh/Month)	31%	97%

V. EDISON'S PROPOSED RESIDENTIAL RATE DESIGN

Q26. What are the criteria that we should use in the overall assessment of Edison's proposed rate design?

A. First, the cost-of-service criterion must be paramount. It is the fundamental basis of the Commission's policy of assigning costs to cost causers, and it is essential to satisfy the efficiency and equity principles I discussed earlier in my testimony. Cost-of-service also responds to the concerns Edison has expressed about the potential emergence of effective competition in the electric service market. (Edison Exh. 10 at page 3) In competitive markets, consumers benefit only as prices move to costs and that movement pressures all market entrants to become more efficient and to reduce their costs of service. If some customers are unfairly burdened to permit lower prices for favored groups, the incentive for suppliers to work at reducing their prices for all customers is effectively blunted. Indeed, in fully competitive markets, such pricing stratagems are not possible.

Second, the serious impact inequities that I have described must be addressed. In past cases, the Commission has often looked at the impacts of a utility's rate design in passing on whether the proposal is just and reasonable (e.g. use of phase-ins to moderate rate shock). In particular, there are unusual impacts of Edison's proposals on particular subgroups within the residential class. I explain in the Technical Appendix that if the principle of equal Proportion of Marginal Cost ("EPMC") -- used by this Commission for interclass allocation -- is not adhered to on an intra-residential basis, Edison's rate structure will continue to impose significant, non-cost-justified surcharges on Edison's low usage and low income customers.

Q27. Describe Edison's proposed residential rate design.

A. The most significant change in Edison's rate design[7] proposal for its residential rate design is a reduction of the relative magnitude of the volume discount for high use residential consumers in non-summer months. Specifically, Edison proposes to increase the non-summer energy charge for usage above 400 kWh by one cent before applying the remainder of its requested increase in revenues to other components of the design. Individual parts of Edison's residential rate under the current and proposed tariffs are shown below in Table 2.

[7] I have restricted most of my discussion to non-space heating rates. I do not recommend here elimination of the space heating rate and emphasize that space heating customers are a relatively small segment of Edison's residential customer base.

TABLE 2
EDISON'S PRESENT AND PROPOSED
RESIDENTIAL RATE DESIGN

	Current Rates	Edison Proposed Rates
Single Family Customer Charge	$8.53	$9.32
Multi Family Customer Charge	$3.57	$3.84
Summer Energy Charge	10.191 Cents/kWh	10.971 Cents/kWh
Non-Summer Energy Charge Below 400 kWh	10.191 Cents/ kWh	10.971 Cents/kWh
Non-Summer Energy Charge Above 400 kWh	6.681 Cents/kWh	8.271 Cents/kWh
Space Heat Above 400 kWh	4.677 Cents/kWh	5.037 Cents/kWh
Non-Summer Discount	34.4%	24.6%

Although Edison's proposal to reduce the discount for high energy use in non-summer months ("the declining block") somewhat improves the rate design, the change is inadequate. Edison's design still has a 25% discount for high-use in the eight non-summer months which is not cost-justified. The revenues recovered from low- and moderate-use customers as a percentage of marginal cost remains significantly greater than the relative recovery percentage for high-use customers. Furthermore, since low and moderate users of electricity are often low income families, Edison's proposed rate structure effectively imposes a surcharge on those least able to bear it.

Edison's own cost study shows the design results in higher recoveries for low and moderate use customers and for residents of the City of Chicago (see City Exhibit ECB-6). In addition, for non-space heating customers, the marginal cost per kWh is the same for usage above 400 kWh as it is for usage below 400 kWh (Edison

Exhibit 11, Schedule 11.2, page 3, column 8). More than a decade ago, the Commission ordered, in Docket 83-0537, that:

> Edison should be directed to file, with its next general rate case, either a proposal to continue reducing the block differential in this rate, or persuasive reasons to continue it based on considerations of cost-of-service.[8]

Since there has never been a cost basis for the declining block rate for non-summer, non-space heat consumption, it is time to implement the Commission's 1984 recommendation and eliminate the volume discount.

Q28. Does Edison's proposed residential rate design accomplish a cost justified reallocation of the revenue requirement burden within the residential class?

A. No. While Edison's proposal is a step in the right direction, its progress must be evaluated by comparing the dollar amount of revenue recoveries from low-use and high-use residential consumers with the cost-of-service for low-use and high-use customers. This comparison is an application of the EPMC standard used by the Commission in Edison's last case for interclass allocations. It is also the essence of the standard adopted in the cost study agreement between Edison and the City. In other words, the ratio of revenue recovery to marginal cost should be no higher for customers who use low and moderate amounts of electricity than the ratio for customers who use high amounts of energy.

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[8] Order from Dockets 83-0537 and 84-0555 consolidated, page 53.

In City Exhibit ECB-5 I show that Edison's proposed rate design does not meet that intra-class EPMC criterion set out based on its own marginal cost study as well as the corrected study. The exhibit demonstrates that such deficiencies exist whether the evaluation uses Edison's cost study results or the cost study results as I have adjusted them. Multi-family non-space heating customers incur too large a burden relative to single family customers; low and moderate use customers have too high a revenue burden relative to high use customers; and, City of Chicago customers incur too high a revenue burden relative to outside city customers. To summarize, although Edison's residential rate design is an improvement, the design still does not properly reflect the cost of serving different usage subgroups within the class and it imposes an unfair, non-cost justified burden on low and moderate usage residential customers, many of whom take service under Edison's multi-family rates.

Q29. Compare the relative cost recovery burdens for single family and for multi-family customers.

A. City Exhibit ECB-6 shows that Edison's proposed residential rate design results in substantially higher revenue recovery from multi-family customers than from single family customers. The relative recovery percentages using Edison's cost-of-service study and the adjusted cost-of-service study are summarized below.

TABLE 3
NON-SPACE HEATING RESIDENTIAL CUSTOMERS
BASED ON EDISON'S PROPOSED RATES

	Revenue Recovery as a Percent of Marginal Cost Using Edison's Cost Study	Revenue Recovery as a Percent of Marginal Cost Using Adjusted Study
Single Family	114%	117%
Multi Family	134%	162%

Table 3 demonstrates that Edison's rate design proposal does not correct the current inequity as between single and multi-family customers. When measured against cost-of-service, the difference in cost recovery is pronounced -- multi-family customers pay 45% more relative to cost than single-family customers. The multi-family customers' lower costs are due primarily to the higher coincident load factor of the multi-family subclass. In other words, apartment dwellers have more efficient energy use patterns and are less costly for Edison to serve than their single-family rate counterparts. Their higher load factor means that these customers incur significantly lower capacity costs in proportion to the amount of energy used as compared to single family customers.

Q30. Describe the relative revenue burdens of low use, moderate use and high use residential customers, not just the multi-family and single family groups.

A. Exhibit ECB-6 demonstrates that although Edison's rate design proposal lessens the over-recovery from low- and moderate-use residential customers compared to high use customers, significant inequities still exist. (Explanations of how I

categorize cost-of-service and revenue recovery by usage level are included in the Technical Appendix). Table 4 below summarizes the relative marginal cost recovery percentages under Edison's current and proposed rate design and demonstrates that low use customers pay 23% more, relative to appropriately measured cost-of-service, than the residential non-space heating average under Edison's proposed rates. Moderate use customers pay 19% more, relative to cost, than average, and high use customers pay 14% less.

TABLE 4
TOTAL NON-SPACE HEAT RESIDENTIAL CUSTOMERS

	CURRENT EDISON RATES		EDISON PROPOSED RATES	
	Revenues/Cost Edison Study	Revenues/Cost Enhanced Study	Revenues/Cost Edison Study	Revenues/Cost Enhanced Study
Low Use: Below 300 kWh	116%	137%	124%	146%
Moderate Use: 351-550 kWh	121%	131%	131%	142%
High Use: 550 Above kWh	97%	97%	109%	110%
Non-Space Heat Average	106%	112%	117%	123%

This table illustrates that based on Edison's own cost-of-service study, the cost recovery from low-use residential customers under its proposed rate design exceeds the percentage for high use customers by 15% -- using the more accurate cost measurements, the disparity is worse. Further, the recovery percentage is only slightly better than the 19% difference between low-use and high-use customers that exists under the current structure. This data confirms that Edison's proposal does not accomplish a cost justified reallocation of the revenue

requirement burden within the residential class. Equity requires that the recovery ratio for low-use customers be no higher than the ratio for high-use customers.

Q31. How does revenue recovery compare with cost-of-service for the City of Chicago and outside City regions of Edison's service territory?

A. Billing distribution data Edison provided to the City allow calculation of similar ratios (revenue recovery to cost of service) for City of Chicago residential customers as compared with customers who reside outside of the City. The regional analysis is presented in City Exhibit ECB-6 and summarized in table 5 below:

TABLE 5
CITY VS. OUTSIDE CITY MARGINAL COST RECOVERIES
NON-SPACE HEAT RESIDENTIAL CUSTOMERS

	CURRENT RATES		PROPOSED RATES	
	Revenues/Cost Using Edison's Cost Study	Revenues/Cost Using Enhanced Study	Revenues/Cost Using Edison's Cost Study	Revenues/Cost Using Edison's Cost/Study
City	114%	127%	125%	138%
Outside	105%	108%	114%	119%
Average	106%	112%	117%	123%

Table 5 demonstrates that there is an over-recovery from City consumers under the current rate structure. Based on Edison's cost study, the over-recovery is 8% more than from outside City consumers (114%-106%). Under Edison's proposed rate design, measured against its own cost study, the revenue recovery relative

to cost-of-service is still 8% (125%-117%) more inside the City than outside the City.

Using the corrected cost-of-service measurements, the ratio of revenue recovery to marginal cost is 19% greater from inside City customers than from outside City customers under current rates and 19% greater using Edison's proposed rates. The reasons for the recovery difference are (1) a higher proportion of multi-family customers inside the City, (2) a greater percentage of low-users among City customers, and (3) City customers' use of relatively more energy during the non-summer months as compared with outside City customers.

In monetary terms, the over-recovery from the City because of rate inequities is $54.9 million under the current design and $56.6 million under the proposed design. This is, in effect, a subsidy from the City to other regions of Edison's service territory, since it reduces the remaining revenue requirement burden for customers outside the City. Clearly, there is no cost basis for such disparate impacts, especially since (as I show below) those inequities are correctable.

VI. THE CITY'S ALTERNATIVE RATE DESIGN

Q32. Have you developed a residential rate design which is more consistent with Edison's marginal costs and the objective of accomplishing a cost justified reallocation of the revenue requirement burden within the residential class?

A. From my discussion above, it is apparent that Edison's residential rate should be restructured so as to be more consistent with marginal costs within the residential class. The cost-of-service analysis confirms that Edison should eliminate the declining block energy charge in non-summer months and implement an inverted block rate in the summer months for high energy usage. Furthermore, the discrepancy in marginal cost recoveries at various usage levels, particularly as reflected in the rates for multi-family as compared to single family customers, needs to be dealt with. I have developed an alternative rate design proposal which addresses these equity and efficiency considerations.

Q33. How did you develop your alternative rate design proposal?

A. In order to create a more equitable residential rate design, I have used a five step process which results in rates that produce the same level of revenues generated by Edison's proposed design. This rate design (for non-space-heat customers at proposed rates) has essentially the same structure as Edison's proposed tariff -- customer charge differences for single and multi-family customers, energy break points at 400 kWh per month and definition of summer and non-summer periods.

In the first step, I eliminated the declining block. Second, I adjusted the single-family and multi-family customer charge so that it does not exceed on-going customer costs. Third, I included an installation charge for the one-time costs incurred to connect new customer locations as a component of the rate design. This charge will likely become a part of construction costs on new residences. Fourth, I adjusted the difference between single and multi-family customer charges to obtain a more equitable revenue burden. Finally, I developed an inverted rate in the summer months which is below Edison's high use summer marginal cost of 16.74 cents per kWh.

Q34. Please describe the specific components of your alternative residential rate proposal.

A. Using the procedure described above (i.e. developing a design with the objective creating more equity among groups within the residential class) I have developed a design with the following components:

TABLE 6
COMPONENTS OF CITY PROPOSED RATE DESIGN

	CURRENT	EDISON PROPOSED	CITY ALTERNATIVE	PERCENT CURRENT VS. CITY
Single Family Customer Charge	$8.53	$9.32	$9.32	-
Multi Family Customer Charge	$3.57	$3.84	$1.00	(72%)
Summer Energy Charge 400 kWh and Below	10.191¢	10.971¢	9.63¢	(5.5%)
Summer Energy Charge Above 400 kWh	10.191¢	10.971¢	14.2¢	39.3%
Non-Summer Energy Charge 400 kWh and Below	10.191¢	10.971¢	9.63¢	(5.5%)
Non-Summer Energy Charge Above 400 kWh	6.681¢	8.271¢	9.63¢	44.1%

The results of my approach meet the objective of equating the relative ratio of marginal cost and cost recovery across usage levels. In other words, I have adjusted the various components so that the relative revenue burdens from customer groups within the residential class are more equitable.

Q35. Would elimination of the declining block volume discount and creation of a cost-based inverted summer rate in your proposal create problems in terms of customer satisfaction and understanding?

A. No. This inverted block structure which I propose is designed so that smaller (and seasonally consistent) users do not see a seasonal price differential. This means all customers would face an energy charge that is the same regardless of season for a base level of usage (400 kWh). However, for usage above 400 kWh per month in the summer, residential customers would pay a higher energy charge. With this type of rate structure, the price signal facing the customer is clearly related to the efficiency of usage and to Edison's incurred costs. If your usage increases in the summer, you will be paying more for the electricity that you use, because it costs more to provide that electricity. Further, customers without seasonal appliances like air conditioners will see no changes in energy prices with a change in seasons. (Recall that I am not proposing elimination of the separate space heating rate.) Without an inverted summer rate and with a declining block, some customers receive rates closer to marginal costs while other customers bear

the burden of excessive revenue requirement/marginal cost differences. My structure corrects these inequitable situations.

Q36. Is the inverted summer energy charge in your proposal a reasonable way to reflect Edison's marginal costs?

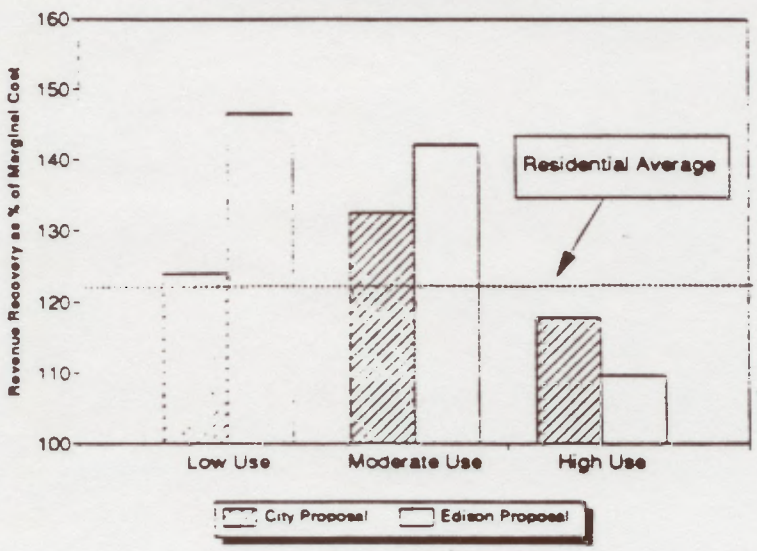
A. Yes. Increased usage in the summer months results in increased marginal capacity (demand) costs as air conditioning load contributes to the peak. Since capacity costs are rolled into the energy charges for residential customers, it is appropriate that energy charges increase with increased usage to reflect these costs. By instituting an inverted rate as I propose, the price signal for high summer usage is closer to Edison's marginal cost, although the per kWh rate is still below Edison's single-family marginal cost of 16.74 cents per kWh. I note that many of the utility companies which serve other large metropolitan areas have inverted rates (some, even in non-summer months).

Q37. How does your proposed residential rate design compare with Edison's rate design in terms of revenue recovery as a percentage of marginal cost for groups of customers within the residential class?

A. City Exhibit (ECB) 3.6 presents revenue recoveries relative to marginal cost for groups of customers within the residential class under my proposed rate design. The revenue recoveries are compared to both Edison's cost-of-service study and to the enhanced cost-of-service study. The exhibit demonstrates that my

proposed rate design does correct many of the problems which exist in Edison's proposal. The difference between multi-family and single family cost is mitigated and the relative recoveries from low-use, moderate-use and high-use customers are less out-of-line. (However, based on the corrected cost study, low-use customers are still incurring a somewhat higher relative revenue burden.) Finally, the revenue recovery burden relative to marginal cost is mitigated for City customers (although using the enhanced cost-of-service study, City customers still pay 8% more than outside City customers).

Figure 5
Residential Marginal Cost Recovery



Q38. What is the impact of your proposed rate design on various customers in the residential class?

A. City Exhibit ECB-7 shows percent rate impacts from my proposed design on customers who use various different levels of electricity. The exhibit shows the range of impacts depending on the energy use level. At the 50th percentile of customers in terms of energy usage, the rate impact is -5.9% while at the 75th percentile, the rate impact is approximately 10%. The break point for which my proposal yields higher rates than Edison's proposal is 700 kWh, which means that 80% of customers will see lower rates than under Edison's structure. Schedule 2 of City Exhibit ECB-7 graphs the relative impacts.

Q39. How do you respond to concerns that your proposed design would result in significant increases for some of Edison's residential customers who use large amounts of electricity in summer months if Edison's entire revenue request is granted?

A. In discussions with Edison involving rate design changes which increase rates to large users of energy, Edison has expressed concerns about the percentage increase impacts on high use customers. However, there are a number of reasons the rate structure change for high users in summer months should nonetheless be made.

(1) The changes are cost-justified:

- As shown in City Exhibit ECB-6, high use customers do not contribute more than their share of costs.

- The summer rate for high use single family customers is below Edison's marginal cost of 16.74 cents in 1994, 20.13 cents in 1998, and 21.34 cents in 2002.

(2) The changes reflect system cost dynamics:

- Edison's capacity increases for generation, transmission and distribution are created principally by summer usage in suburban areas -- air conditioning usage in particular. If these customers adjust their usage because of the rate structure, future Edison costs will be reduced.

(3) The charges are fair:

- As shown in Figure 1, the increases for high-use customers simply are no more significant than the increases which have, in the past, been experienced by low-use customers as a result of the volume discounts.

- As shown in Figure 2, the increases for high-use customers simply bring Edison's rate structure in line with the residential rate structure of other utility companies serving similar sized metropolitan areas.

(4) Affected customers have options:

- High-use customers who are worried about their electric bill are ideal candidates for Edison's time-of-use rates, energy efficiency programs, and other efficiency or conservation measures. (The higher customer charges of the time-of-use rate are not a significant component of high users' electric bills, and Edison already has a DSM program focused on air conditioner efficiency.) These customers usually have more flexibility in the timing, pattern, and level of their uses of electricity than other customers.

- The testimony of other City witnesses shows that the rate increase Edison has requested is not warranted. If Edison receives a lower increase, the rate impacts shown in City Exhibit ECB-7 will be reduced by the percentage of the rate increase relative to Edison's request.

VII. NON-RESIDENTIAL RATE DESIGN

Q40. What changes does Edison propose for its street lighting services?

A. Edison's proposed rate design results in substantially lower revenue recovery relative to marginal costs for rates 23 and 26 than for street lighting services to municipalities providing their own lamps. Even though there is already a 45% percentage difference in marginal cost recovery for the two groups of customers, Edison proposes to increase rates for all street lighting by the same percentage. (Increasing the disparate rates by the same percent actually aggravates the existing recovery differential). There is no justification for the current difference in revenue recovery or for perpetuating it. The rates should be changed so as to eliminate the cost recovery difference. To remove that difference and bring contract street lighting rates closer to the system average recovery level, they should be reduced by 5.4%.

Q41. What is the impact of Edison's overall rate design including residential and non-residential rates on customers in the City?

A. Because of the factors noted at the beginning of my testimony, Edison's current rate design and its rate design proposed in this case are more harmful to the City of Chicago as compared with other regions served by the company. Under Edison's proposed rate design, revenues generated from City of Chicago residential customers of Edison collect 138% of marginal cost while outside City

customers collect 119% of marginal cost -- a differential of 19 percentage points. If Edison's rate structure is changed so that marginal cost recovery percentage is the same inside and outside of the City of Chicago, revenues collected from City residential customers would be reduced by 10.3% and revenues collected from outside City customers would be increased by 3.8%. My proposed residential rate design mitigates the residential revenue recovery/marginal cost differential for the City and outside City regions. If Edison's low-use customers are no longer penalized for low volume or efficient use, as under the alternative rate design I propose, there would only be an effective rate decrease for the average (approximately 350 kWh/month) City residential customer of about 6%, even if Edison receives its full request.

In terms of overall marginal cost and overall revenues including residential, business and other customers, Edison's proposed design results in a recovery percentage of 147% for City customers and 140% for outside City customers. The reason for the disparity between marginal cost and revenue recovery as between the City and outside City regions of Edison arises because of the residential rate design and Edison's proposed inter-class rate allocation (the City has a higher proportion of non-residential usage). The overall differences in regional recovery percent are demonstrated in Table 7 below:

TABLE 7[9]
MARGINAL COST AND REVENUE RECOVERY UNDER
EDISON'S PROPOSED RATES ($000's)

	CITY OF CHICAGO			OUTSIDE CITY OF CHICAGO		
	REVENUES	COSTS	MARGINAL COST RECOVERY	REVENUES	COSTS	MARGINAL COST RECOVERY
Residential	611,794	448,908	136.28%	1,675,891	1,357,561	123.45%
Rate 6	596.005	385,666	154.54%	1,455,997	942,153	154.54%
Rate 6L	464,277	306,320	151.57%	1,048,243	691,610	151.57%
Street Lighting	16,560	8,090	204.7%	21,110	16,554	127.52%
Total	1,688,336	1,148,984	146.97%	4,201,221	3,007,879	139.67%

If the City paid the same proportion of costs as outside City customers, revenues would be reduced by $60.64 million inside the City (a 3.6% reduction).

Note however, that correction of the rate inequities identified above does not offset all subsidies that exist between the City and outside City regions of Edison. Correction of the identified rate inequities would only ameliorate the rate difference subsidy.

Q42. Does this conclude your direct pre-filed testimony.

A. Yes.

[9] For rate 6 and rate 6L customers, I have simply allocated total energy usage. Actual marginal cost differences on a regional basis may be larger because of lower average business usage in the City and the declining block structures in rates 6 and 6L. I will refine this analysis when I receive outstanding data requests from Edison.

TECHNICAL APPENDIX TO THE

PREPARED DIRECT TESTIMONY OF

EDWARD C. BODMER

TECHNICAL APPENDIX TO TESTIMONY OF EDWARD C. BODMER

I. INTRODUCTION

Q1. Please outline the analysis which is included in the technical appendix.

(a) This technical appendix describes my analysis of Edison's financial cost-of-service study and my geographic cost allocation. First, I discuss my approach in reviewing Edison's cost-of-service allocations. Second, I describe and quantify revisions which Edison should make in its measurement of distribution capacity costs. Third, I discuss changes Edison should make classification of customer costs. Fourth, I summarize my review of Edison's marginal bulk power costs. Fifth, I classify cost-of-service for alternative customer groups within the residential class. Sixth, I explain why the principle of equal proportion of marginal cost should be applied to customer groups within the residential class. Finally, I present my analysis of how Edison's rates can be separated on a geographic basis.

Q2. Summarize the quantative results of your analysis of Edison's cost-of-service.

(a) In reviewing Edison's cost-of-service, I determined that:

1) The marginal distribution capacity cost should be reduced from $594/kw to $294/kw for urban customers and increased to $375/kw from $283/kw for suburban customers in order to correspond to actual physical conditions and Edison's plant records.

2) Class related distribution capacity costs should be increased by .4% for single family customers and decreased by 1.3% for multi-family customers to correct distortions in applying non-coincident loads to secondary distribution.

3) Marginal customer costs should be lowered from $10.75 per customer to $6.67 per customer for single family customers and from $8.33 per customer to $5.17 per customer for multi-family customers to exclude installation costs and bad debt expenses.

4) Installation costs for construction of new single family homes of $419 per new home and $114 per new multi-family dwelling should be included in customer costs.

5) Bad debt costs of $24 million should be removed from customer costs and instead be included as a 1.5% adder to overall costs within the residential class.

6) Marginal costs for the multi-family subclass are reduced by 17.4% to reflect the above changes and marginal costs for the single family subclass are reduced by 2.8%. Overall residential marginal costs are changed by less than 5% from the adjustments.

7) Classification of customer costs segregated by usage level demonstrates that, at current rates, the lower one third of Edison's customers in terms of energy usage recover 25% more than average residential customers, while

the median one third recovers 19% more than average and the upper one third recovers 14% less than the residential. The classification also shows that City of Chicago residential customers recover 14% more than the residential average and outside City customers recover 4% less than the residential average.

II. MARGINAL COST THEORY

Q3. How have you approached your review of Edison's cost-of-service allocations?

(a) In reviewing Edison's cost study, I have used theoretical principles which have historically been applied by Edison and the ICC and cost quantification methods developed by Edison, whenever I found the theory and measurement reasonable. That is, my adjustments to Edison's costs do not involve re-defining the fundamental theory and computational parameters which have been used in Edison cases for many years.

Q4. Did you use marginal cost principles in reviewing these cost-of-service and rate design issues?

(a) Yes. The ICC has used marginal cost studies as a guide in designing Edison's

rates for more than a decade.[1] Marginal cost theory is a reasonable method for allocating Edison's costs, and I have therefore concentrated my cost analysis on Edison's marginal cost-of-service study. Allocations based on marginal cost (in the opinion of the Commission and most economists[2]) result in efficient allocation of resources. If prices reflect marginal cost, consumption decisions will appropriately account for the cost of scarce resources which must be foregone to produce a product.[3]

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[1] In 1981 the Commission stated:

"Marginal cost pricing promotes the efficient use of the Company's resources, in producing electricity and leads to equitable and reasonable rates for all consumers. From a societal standpoint marginal cost pricing allows every electric customer to weigh the impact of his consumption as to whether he will be better off by virtue of the purchase of savings of one more or one less unit of electricity. This centers from the theoretical underpinnings of marginal costing which is the forward-looking or prospective nature of the costs analyzed versus the historical framework of embedded cost principle."

"The Commission is of the opinion that the cost of service standard, and specifically marginal costs, will encourage conservation, promote efficiency, provide equitable rates to consumers, and should therefore be adopted ..." (Order from docket 80-0546, page 47 and 48, July 1, 1981.)

[2] According to William Vickery, a noted pricing economist:

"Marginal cost must play a major and even a dominant role in the elaboration of any scheme of rates or prices that seriously pretends to have as a major motive the efficient utilization of available resources and facilities." (Vickery, William S. 1955, Some Implications of Marginal Cost Pricing for Public Utilities, American Economic Review, Papers and Proceedings. May, 45: Page 665.

[3] Alfred Kahn defines marginal cost as follows:

"The cost to society of producing anything, consists, really in the other things that must be sacrificed to produce it: in the last analysis "cost" is opportunity cost - the alternatives which must be foregone... If consumers are to make the choices that yield the greatest possible satisfaction from society's limited aggregate capacity, the prices that they pay for the various goods and services available to them must reflect their respective opportunity costs..."

Q5. How do you define marginal cost in the context of Edison's cost and rate design proposals?

(a) A working definition of marginal cost is the change in Edison's total costs associated with a small change in output. While there may be some debate as to what constitutes long-run marginal cost and short-run marginal cost, the concept is always forward looking and it must deal with changes in cost which are directly associated with changes in consumption. For Edison, changes in consumption include energy consumption during various hours (kWh), energy consumption during peak periods (KW), and incremental customer installations. One of the fundamental and elementary propositions of marginal cost is that a sunk cost (an investment made five or ten years ago) cannot be affected by a future change in consumption and are irrelevant to efficient pricing.

IV. MARGINAL DISTRIBUTION COST

Q6. Summarize your review of Edison's approach for computing marginal distribution capacity costs.

(a) I reviewed Edison's method of computing distribution costs both from a

conceptual perspective and from a practical measurement standpoint. In my opinion, the underlying theory behind Edison's method of computing distribution capacity cost through quantifying the costs of serving representative new customers in different density areas is a reasonable approach for estimating long-run marginal cost.[4] However, to implement the theory faithfully Edison must change its mechanics of calculating relative distribution capacity costs incurred by urban customers. I have also concluded that Edison should change the unit of consumption it uses for measuring multi-family, class-related distribution costs.

Edison calculates marginal distribution capacity for customers within three different density categories by estimating the quantities of new equipment required to serve "representative" customers.[5] The estimated physical quantities of equipment are multiplied by the costs of purchasing and installing new equipment to calculate marginal distribution capacity cost. For example, in the case of the 12 KV primary mains, quantities are estimated in feet of line for the representative customers; the quantities are multiplied by the cost per foot per KW of installing new lines. Edison assumes that the components of the primary distribution system must be constructed to handle peak usage coincident with the

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[4] It is important to note that alternative methods such as computing new demand related distribution expenditures on a regional basis could be equally appropriate from a conceptual standpoint. In other words, projected distribution costs could be linked with increases in peak demand in a manner analogous to transmission cost allocations.

[5] The amount of new equipment is derived from a survey developed in 1983 that was completed by engineers in Edison's regional offices.

hour of the system peak. Other distribution system components (the community tap and the transformers) are assumed to be driven by the level of the class load on the peak day at the time the class reaches its maximum demand, except in the case of multi- and single family residential customers where sub-class rather than class peak is used.

Edison's approach in measuring marginal distribution capacity cost for representative new customers captures the fundamental marginal cost principle of linking forward-looking (long-run) costs with consumption that gives rise to the cost. Furthermore, the methodology recognizes that marginal distribution costs varies for different density areas according to physical characteristics of the distribution system. For example, if peak demand increases in suburban areas, Edison's distribution capacity costs should increase by the cost of installing new distribution equipment for representative medium density customers.[6]

While Edison's procedure is reasonable on a conceptual level, close examination of the mechanics of Edison's distribution cost calculations reveals first that its definition of a representative customer is wrong. Specifically, Edison's survey

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[6] Edison's calculation -- total cost divided by total load -- would yield results similar to incremental cost divided by incremental load , but only so long as load is growing and there is not excess capacity on the regional distribution network. There are probably many areas in the City of Chicago where excess capacity exists on the network and the marginal cost of distribution capacity is therefore zero.

approach (see Q22-Q24 of my testimony) resulted in significant over-estimation of the distribution capacity cost for urban residential customers and under-estimation of costs for medium density suburban customers. Further, the unit of consumption for measuring class related costs assigned to multi-family customers must be revised to correspond to the overall residential non-coincident peak.

Q7. Describe your proposed revisions to Edison's measurement of marginal distribution costs.

(a) Edison should change its calculation of marginal distribution capacity cost to mirror actual conditions for representative heavy, low and medium density customers. As I stated earlier, Edison's general methodology of calculating marginal distribution costs using existing representative customers is a reasonable approach for computing long-run marginal cost -- the cost of replacing similar assets using new equipment adequately quantifies how distribution capacity costs increase due to increases in load. However, in measuring distribution capacity cost for customers in the different density areas, Edison's marginal cost study does not now reflect representative conditions for urban residential customers.

The marginal distribution capacity cost for heavy density urban customers used in Edison's cost study is $593.9 per KW for non-space heating single family

customers[7] (27.31% of Edison's residential sales); the cost for medium density suburban customers is $283.5 per KW (67.54% of residential sales) and the cost for light density rural customers is $917.39/KW (5.15% of residential sales). The cost differential between urban and suburban customers is due entirely to assumptions regarding the cost and amount of in-duct underground cable for urban customers. Edison assumes 18,400 feet per KW for urban areas and 1,700 feet per KW for suburban areas. Edison assumes the total quantity of primary distribution lines for suburban customers is 24,930 feet per KW, compared with the total quantity for urban customers of 21,900 feet per KW.

Conceptually, Edison's approach for computing marginal distribution capacity cost implies that physical conditions for representative customers should be consistent with actual conditions. For example, if the existing system is generally characterized by overhead lines, incremental capacity additions will probably be overhead, and if the existing capacity is underground, new additions will likely be undergrounded. Therefore, existing underground and overhead lines per customer should be similar to Edison's assumptions for representative customers. Table 1 compares actual conditions for the City of Chicago and outside City areas[8] with

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[7] For discussion purposes, I concentrate on single family customers without space heat. The analysis is almost identical for other customer classes.

[8] Given that the quantity of energy assigned to urban load approximately corresponds to the City of Chicago region (27%), and given that the City represents the overwhelming proportion of urban customers, use of City of Chicago data is a good way to represent conditions of all urban area customers.

Edison's cost-of-service study assumptions for urban heavy density customers and medium density suburban customers:

TABLE 1
ACTUAL CONDITIONS AND REPRESENTATIVE
CUSTOMER ASSUMPTIONS

	Actual City Feet Per Customer	Assumed Urban Feet Per Customer	Percent Difference	Actual Outside City Feet Per Customer	Assumed Non-Urban Feet Per Customer	Percent Difference
Overhead	62,262	24,952	40%	263,957	124,506	47%
Underground	23,309	70,386	302%	61,777	33,492	54%
Total	85,572	95,338	111%	325,734	157,998	49%

Table 1 demonstrates that there are dramatic differences between assumed and actual conditions for both urban customers and suburban customers. The quantity of underground cable for urban customers is overstated by more than 300%, while the non-urban quantities of overhead and underground wire are significantly understated.

Errors in Edison's assumptions are confirmed by simply observing its distribution system. That residential areas in the City of Chicago are predominantly overhead is demonstrated by simply traveling around City of Chicago neighborhoods. That conclusion is supported by the relative amounts of such facilities shown for Chicago in Edison's plant report. Similarly, it is intuitive that the total quantity of facilities per customer is less in urban areas than suburban and rural areas; there

are more customers per mile in the urban areas. The reason Edison's data does not reflect actual conditions is that most of the engineers Edison surveyed in 1983 apparently interpreted the survey's definition of urban areas to refer to the Chicago Loop, which includes virtually no residential customers.

Q8. **How have you adjusted Edison's marginal distribution costs to reflect actual conditions in urban, suburban and rural areas?**

(a) Exhibit (ECB) 3.1 illustrates how I have revised Edison's distribution capacity costs to reflect actual, representative conditions in urban residential areas. The exhibit uses data for single family residential customers (the changes for other customer groups would be virtually identical). Schedule 1 of City Exhibit (ECB) 3.1 shows data on Edison's actual distribution system in the City of Chicago and outside City regions. Schedule 2 displays my adjustments to distribution capacity costs for heavy density and medium density customers. Schedules 3, 4 and 5 carry the changes in distribution cost through to single- and multi-family aggregate marginal costs.

Lines 1 to 3 of Schedule 1 show the amount of wire on Edison's system on a regional basis, and lines 4 to 6 show the circuits. Lines 10 to 18 demonstrate the actual quantity of wires per MW and per customer for the City of Chicago (urban)

regions and the outside City (primarily suburban) regions of Edison, while lines 29 through 23 show Edison's assumptions. The data demonstrate that far less overhead and underground lines are required for serving urban areas than Edison's study assumes.

Schedule 2 of City Exhibit (ECB) 3.1 uses Edison's format for computing distribution capacity costs to demonstrate my calculation of revised costs. The left hand side of the exhibit details Edison's computations while the right hand side shows the adjusted data. Column H shows my revised quantity assumptions derived from actual conditions; column I shows my revised cost assumptions for urban areas using non-Loop area costs for in-duct cable (since Edison's urban assumption is for loop-area costs and less than 1% of City residents reside in the loop). Exhibit (ECB) 3.1 demonstrates that by correctly reflecting the nature of physical assets used to serve urban residential customers, the distribution capacity cost is reduced from Edison's estimate of $594/KW to $294/KW while the distribution capacity cost of medium density customers is increased from $283/KW to $376/KW.

Schedules 3, 4 and 5 of City Exhibit (ECB) 3.1 derive levelized distribution costs and allocate costs to single and multi-family residential customers. (I did not make any adjustment for non-residential customers, because I do not yet have sufficient

information on the location of loads). Schedule 3 shows the adjustments to capacity cost per KW for subclasses of residential customers. Schedule 4 develops the weighted average distribution cost from subclass loads allocated to heavy, medium and light density customers. Finally, Schedule 5 levelizes the distribution costs and allocates general plant and operation and maintenance expenses to distribution capacity costs.

Q9. **Should Edison revise the measurement basis for which distribution cost is applied to customer classes?**

(a) Yes. Edison applies the cost of the primary distribution to class coincident peak load and the cost of the secondary system to class non-coincident peak load on the day of the system peak. In other words, the levelized cost of the primary main per KW is multiplied by the level of demand of the customer class at the time of the system peak while the levelized cost of transformers and the community tap is multiplied by the maximum level of hourly demand incurred by a customer class on the peak day.

For most customer class groups this assumption is reasonable, since regional demands drive the need for new class related distribution equipment and since benefits from diversity of load are less meaningful for transformers and community

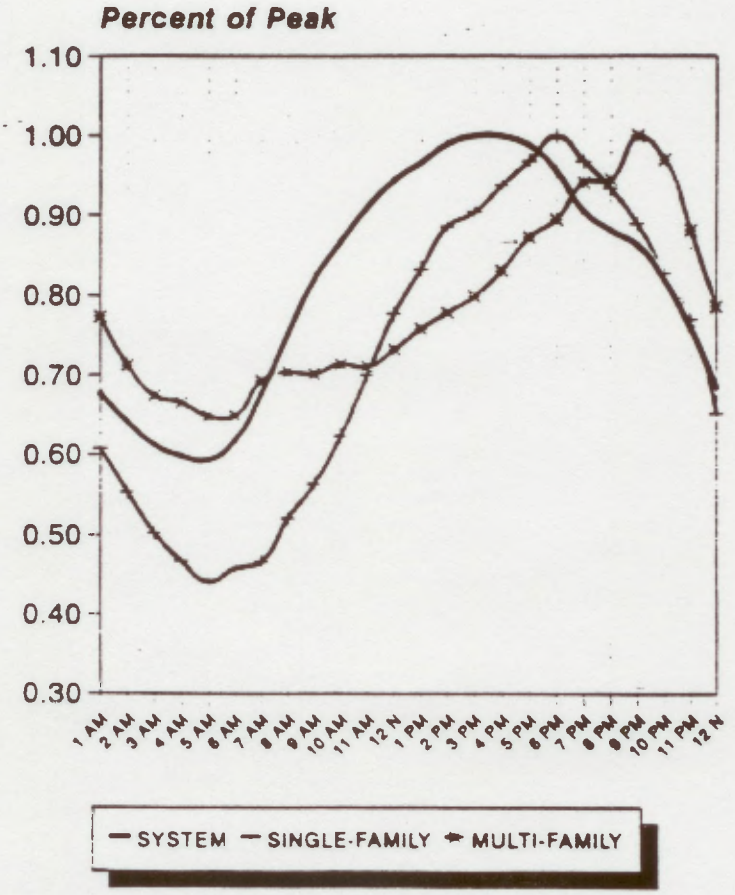
taps than for other facilities. However, in the case of the multi-family sub-class of residential customers, Edison's method does not produce reasonable results. The multi-family subclass does not reach a peak until 9:00 p.m. in the evening while the system peak occurs at 4:00 p.m. and the residential class peak occurs at 6:00 p.m. Table 2 shows that in this respect the multi-family sub-class is different from other customer classes:

TABLE 2
COINCIDENT PEAK COMPARED WITH NON-COINCIDENT PEAK

	Coincident Peak	Non-Coincident Peak	% Difference	Time of Peak
Multi-Family, No-Heat	665.8	802.3	22.34%	9:00 P.M.
Single Family, No-Heat	5,268.7	5,642.5	7.09%	6:00 P.M.
Residential	6,060.0	6,736.5	11.11%	6:00 P.M.
Rate 6	4,925.5	5,128.8	4.13%	3:00 P.M.
Rate 6L Under 10 MW	2,948.2	3,085.1	4.64%	2:00 P.M.
Rate 6L Over 10 MW	1,110.3	1,137.6	2.46%	11:00 A.M.

The relative usage of single-family customers and multi-family customers is shown on Figure 4 below.

Figure 4
Single-Family and Multi-Family Load Shape



Q10. How should Edison revise the basis for computing class related distribution costs for multi-family customers?

(a) Instead of multiplying class related distribution capacity costs by the amount of

non-coincident peak load which occurs at 9:00 p.m., the class costs should be measured against the level of peak load which occurs when the residential class reaches its peak. This method reflects the fact that the distribution system is sized to meet regional needs and that apartment buildings and single family homes are often located in the same geographic area. If the overall residential class coincident peak is used to allocate costs of transformers and the primary taps, consistent with the manner in which these costs are allocated for rate 6 and rate 6L customers, the peak is reduced to 729 MW for multi-family customers and increased to 5,854 for single family customers.

III. CLASSIFICATION OF MARGINAL CUSTOMER COSTS

Q11. What are your general conclusions with respect to the manner in which Edison computes marginal customer costs?

(a) I disagree from a conceptual standpoint with the way customer costs are classified. Specifically, I assert that Edison's cost-of-service approach would be significantly improved by recognizing that costs of new installations (meters and service drops) are causally linked to construction of new customer premises and are not related to existing customer premises. I have also concluded that bad debt

costs should not be classified as a marginal customer cost.

Q12. Explain how those changes would improve Edison's marginal cost-of-service study.

(a) By assigning the one-time portion of marginal customer costs associated with new customer installations to the new customers in a class, all existing customers in the class continue to be assigned the on-going variable portion of marginal customer costs. However, the full cost of installing meters and service drops is assigned only to customers who actually cause them by constructing new premises. The primary impact of this re-classification of customer costs is a change in the allocation of costs between customers who build new premises and existing customers.

Edison's method of combining installation costs which arise from new (marginal) customers together with on-going costs that can be directly related to existing customers is inconsistent with fundamental marginal cost allocation principles. As I stated earlier, marginal cost is the change in forward-looking costs associated with a (small quantity) change in consumption. Fixed installation costs associated with adding new customers to the system by definition do not vary for existing customers. This means there is no marginal value associated with these

installation costs for existing customers. Combining installation costs and on-going costs distorts costs for both new and existing customers; it does not appropriately measure Edison's actual marginal costs produces results inconsistent with a competitive market model, where prices move to marginal cost. In addition, it leads to distorted pricing signals for the purchase of new or existing businesses or residences.

Q13. Why is combining installation costs with on-going customer costs inconsistent with marginal cost principles?

(a) Assigning costs of new meters and new service drop installations to existing customers conflicts with the basic marginal cost concept that forward-looking costs must be linked to consumption activities which give rise to the cost. In other words, assignment of installation costs to existing customers does not correspond to the fundamental notion that marginal installation costs are caused by new customers, and have nothing to do with existing customers. On the other hand, assigning installation costs to customers who construct new premises matches the manner in which incremental forward-looking costs will actually be incurred by Edison. For example, a rapidly growing group of customers will obviously cause Edison to incur more future installation costs than a customer group which is not growing at all.

Q14. Is differentiating customer costs between installation costs and on-going cost consistent with marginal cost pricing in competitive markets?

(a) Yes. In attempting to justify the approach of charging existing customers the cost of equipment for new installations, one could try to argue that assigning levelized costs to existing customers is analogous to renting meter and service drop equipment in a competitive market where pricing occurs at marginal cost. However, this argument does not withstand close scrutiny. It is difficult to imagine that in a competitive market for installation equipment, a non-financial short-term lease option would be viable, since installation equipment has negligible resale value after it has been installed. If any rental option would exist, it would involve simply spreading fixed payments over time arising from new installation and it short-term cancelable leases would not be viable. J. Frazier-Hampton of Pacific Gas and Electric explains this concept:

"Assume, for example, that a market existed where there were multiple providers of hook-up services. Consumers in this market would be charged capital charges reflecting installation costs and financing charges in effect at the time of the hook-up, plus an annual maintenance service fee. When a new home was built, hook-up services would be purchased; the equipment would be bought and paid for at the time of installation or paid off over a fixed number of years, and an annual fee would be charged for meter reading, accounting, and any required maintenance and repairs.[9]

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[9] If the hook-up costs were paid for over a fixed number of years, the cost of the hook-up would be amortized over some contract period. A contract would exist between the utility and the customer that would not place any other of the utility's customer's at risk for collecting the full cost of the hook-up over the contract term. The present value of the contract payments would leave the

If the home were sold, the selling price would reflect ownership of the equipment, or it would reflect the portion of the equipment that is owned and the buyer would assume the financing payments until the equipment were paid off. If any service provider tried to charge its old customers the new capital charge rate, or to collect capital charges from old customers who had already paid the full cost of their equipment, they would quickly lose all their business to competitors who could make a fair return by charging only for the capital service they actually provide.

Another important difference between the current rental approach and the operation of a competitive market for hook-up services is what would happen if a customer left the system. Under a rental option, the unpaid cost of the hook-up equipment would probably be lost because (the utility company) generally recovers nothing in equipment or salvage value when facilities are abandoned.

In a competitive market, service contracts would ultimately be developed to avoid this type of vulnerability. Customers would sign contracts that would require payment of any unpaid balance should they stop using the utility service. Otherwise, service providers would have to make up the difference by charging continuing customers more, which would put the service providers at a competitive disadvantage with respect to firms with full cost recovery contracts with all customers. This would quickly drive firms without full cost recovery contracts out of the customer hook-up business."[10]

Q15. Can assigning installation costs to existing customers distort consumption decisions and lead to inefficient allocation of resources.

(a) Yes. Including the costs of new meters and service drops in prices for existing customers can lead to inefficient consumption decisions related to the purchase

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utility and its customers indifferent to immediate payment for hook-up or the stream of contract payments. This is distinctly different from the concept of rental charge produced by the real economic carrying charge. A rental charge assumes that a portion of the hook-up is used each year. This implies that if a customer terminates service, the value of the hook-up will be equal to the original cost of the hook-up times the fraction of its remaining life over its total life.

[10] Testimony of J. Frazier-Hamilton of Pacific Gas and Electric Company, Application No. 91-11-036, November 26, 1991.

of newly constructed residences or businesses. Consider the situation where a customer purchases an existing house that already has metering equipment and a service drop in place. In this transaction, Edison does not incur incremental costs other than its ongoing variable expenses for maintenance, meter reading and billing. On the other hand, if the customer purchases a newly constructed home, Edison's incremental costs do include hook-up costs for installing a new meter and a new service drop.

A simple example clarifies that unless there is a differential in Edison's rate whereby the cost of the new home includes a charge for installation equipment, inefficient consumption can arise. Assume that without the installation cost, the value of a new and an existing house is identical for a prospective purchaser. Assume also that the new residence has a price slightly below the price of the existing residence, but that the price differential is less than Edison's incremental cost for installing new meter equipment and a new line drop. In this case, if Edison's rates do not reflect the incremental cost of the installation equipment associated with the new home, the purchaser will select the newly constructed house, even though the true value of the new house is less than the value of the existing house when total costs - including Edison's incremental costs - are considered.

Q16. If assigning installation costs to new customers is appropriate for allocation of customer costs, why is it not an appropriate method for allocation of other cost categories such as distribution capacity costs?

(a) It is important to emphasize that the theory of assigning marginal customer installation cost to new customers does not apply to most other types of marginal costs. One could not, for example, extend the argument to conclude that the cost of new distribution capacity should be assigned to customer specific sources of incremental load, a customer's incremental load could be off-set by reductions in load elsewhere on the system within the relevant area that affect marginal costs. Stated in gross terms, the actions of an existing customer cannot affect the cost of installing meter equipment and service drops of a new customer, but actions of existing customers can affect Edison's incremental distribution capacity costs.

Also, since distribution costs on the Edison system occur on a continuing basis, an increment of load in one period can be off-set by a reduction in load in another period (i.e. a decrease in load in a future year can potentially off-set increases in load in the current year). Therefore, in the case of distribution capacity cost, consumption decisions in future periods can affect costs, so it is appropriate to use levelized cost rather than lump sum investment cost. However, this is not the case with new metering equipment and new service drops where actions of new

customers are independent of the actions of existing customers. This means that, unlike marginal capacity costs, the full cost of new service drop and meters rather than the levelized carrying charges of the investment, is the theoretically correct measure of marginal cost.[11]

Q17. Why should the cost of replacing meters and service drop be included as a component of on-going marginal customer cost?

(a) Edison's current study assumes that meter equipment and the service drop are installed immediately and that the levelized costs of installing new equipment should be incurred by all existing customers. In my proposal, the cost of new equipment is assigned to new customers, but costs of replacing existing equipment continues to be incurred by existing customers. Replacement of meters and services is marginal from the perspective of existing customers because if an existing premise is abandoned, there will be an avoidable meter and service drop which will not have to be replaced. Therefore, existing customers should pay, as part of on-going costs, a sort of insurance premium for replacing their existing equipment at the end of its useful life. This premium is measured by the present

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[11] For distribution and bulk power cost assignment, marginal cost assignment principles are illustrated using the analogy of a balloon. When any air in the balloon causes it to expand, the cost changes cannot be isolated to a particular air molecule. On the other hand, the forward-looking marginal customer access costs that Edison will actually incur can be directly isolated to new customers.

value of replacing the equipment at the end of its expected life. However, since the premium is paid year-in and year-out on an on-going basis, while replacement of equipment occurs in a one-time lump sum, annualized costs rather than a lump-sum cost should be used. Schedule 6 of City Exhibit (ECB) 3.2 shows my calculations of the premium which should be included in the up-front costs. The exhibit also demonstrates, with a simplified example, why my approach reconciles to the actual cost of replacing equipment.

Q18. Should bad debt costs be included in the calculation of on-going customer costs?

A. No. Bad debt expenses are not marginal costs because they are not forward-looking costs that have anything to do with consumption decisions of existing customers who pay their electric bills. There is absolutely no theoretical justification to classify bad debt costs as a component of marginal customer cost. However, even though bad debt expenses have no marginal value, it is not patently unreasonable to assign bad debt costs on a customer class basis.

The problems with assigning bad debts to customer cost are confirmed by a analogy from competitive markets, which regulation should emulate. In non-regulated industries where firms which price according to marginal cost, bad debt costs cannot be recovered from fixed fees unrelated to the level of consumption. For example, a grocery store cannot impose a toll charge to cover the costs of

shoplifters where the toll is imposed whether or not anything is purchased from the store. Rather, the grocery store must increase prices on the products which are sold.

In the cost study filed in docket 90-0169, Edison classified bad debt expense as a component of customer cost using a regression analysis which yielded the result that bad debt expenses are more closely correlated with the number of customers than with the amount of energy sold. The correlation between customers and bad debt cost is not at all surprising since low income consumers tend to experience higher bad debt costs than other customers and since low income consumers also tend to be low users of energy.[12] However, the correlations resulting from Edison's regression analysis have no relevance whatsoever to measurement of marginal customer costs. Indeed, the regression analysis simply demonstrates that imposition of bad debt costs in the customer charge means that low-income customers who do pay their bills incur more of the cost for other people who do not pay their bills. If Edison's existing customers who pay their bills must incur costs for people who do not pay their bills, there is no basis for imposing the cost on those customers who are least able to afford to pay.

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[12] Hemphill, Ross C., David A. Poyer and Conrad R. Reddick, Efficient Rate Design For Low Use, Low Income Electricity Consumers, The National Regulatory Research Institute, Proceedings of the Eighth NARUC Biennial Regulatory Information Conference, September 9-11, 1992, Columbus, Ohio.

There are significant differences in bad debts for the various customer classes and Edison has proposed to recover bad-debt costs experienced by each class from customers within the class -- i.e. residential bad debt costs would be recovered from customers within the residential class and non-residential bad debt costs would be recovered from non-residential customers. Under that method, I recommend that bad debt costs be included as a percentage adder to marginal costs, which is analogous to equal percentage of marginal cost (see my discussion below). For the residential class, the bad debt costs are $24,189 million which is 1.5% of residential marginal cost.

Q19. Please describe City Exhibit (ECB) 3.2 which explains how you have adjusted Edison's calculation of marginal customer costs.

(a) City Exhibit (ECB) 3.2 includes 6 schedules which show the impacts of my changes to Edison's customer cost calculations. Schedules 1 through 5 have the same format as Edison's cost-of-service study exhibits and Schedule 6 illustrates my computation of replacement factors for meters and service drops.

Schedule 1 summarizes the effect of my adjustments on Edison's customer costs. Column A shows the cost of meters without installation costs, column B shows the cost of services without installation costs and column C shows the customer

accounting and collecting costs without bad debt expenses. Column G shows the adjusted customer costs which may reflect on-going costs. Column H shows the number of new customer installations, column I shows the total marginal cost associated with new installations and column J shows the installation cost per new customers.

Schedule 2 of City Exhibit (ECB) 3.2 shows Edison's marginal cost of meters adjusted for re-classification of on-going costs and installation costs. The on-going cost excludes the annual revenue requirement from the cost of new meters (column F), but it includes operation and maintenance expense on meters (column G). On-going cost also includes a provision for replacement costs of meters (column K) based on the factors developed in Schedule 6. Column M shows total on-going costs and column N shows total installation costs. The cost of installing meters per customer is shown in column M and the number of new meter installations from the analysis in Schedule 5 is shown in column O. Column P shows the total marginal cost attributable to new installations through multiplying the installation cost by the number of new meters.

Schedule 3 of City Exhibit (ECB) 3.2 displays the marginal cost of service based on re-classification of installation costs and on-going costs. The exhibit has the same format as Schedule 3. The factor for computing the provision for replacing

meters is changed because of the 40 year life of services versus the 30 year life of meters.

Schedule 4 of Exhibit (ECB) 3.2 presents the costs of customer accounting and collecting revised for exclusion of bad debt costs. The exhibit uses Edison's format, but it excludes all dollar amounts for bad debt expense. The amount excluded in the residential class is $24,189 million. Other columns correspond to Edison's calculation except for adjustments related to the bad debt column (column K).

Schedule 5 of City Exhibit (ECB) 3.2 shows my derivation of the number of newly installed customer premises for each customer class. The analysis from this schedule is used to quantify marginal installation costs of meters and services shown in Schedule 2 and Schedule 3. Column A shows the number of customer installations from the 1990 cost-of-service study filed in docket 90-0169 and column B shows the number of customer installations in 1993 from this filing. Column C is the increase in installations from 1990 to 1993 and column D is the average annual increase.

Schedule 6 of Exhibit (ECB) 3.2 shows how I have derived factors to consider the cost of replacing meters and services at the end of their useful lives. I assume the

average remaining life of services is half of the new life and the remaining life of meters is one half of the service life when new, 30 years. I base the analysis on an assumed $100 cost to replace in future dollars. Column B shows the present value of the replacement using a real discount rate of 6.33% which is derived from the cost of capital used in Edison's study. Column C shows annual levelized dollar amounts which sum to the present value of replacement. Column shows that the factor applied to $100 of new meter equipment is $2.62 (2.62%) and column F shows that the factor for meters is 4.19%.

Q20. Did you review other aspects of Edison's cost-of-service determinations?

(a) Yes. However, I have discussed in detail only those aspects where I recommend a change in this case.

IV. CLASSIFICATION OF RESIDENTIAL COSTS BY USAGE

Q21. What are the combined impacts of your recommended improvements to Edison's marginal cost-of-service study on measured marginal cost for residential customers?

(a) City Exhibit (ECB) 3.3 shows Edison marginal cost-of-service for residential

customers including capacity costs, energy costs, customer costs, and bad debt costs using a similar format as Edison's capacity cost summary. Capacity costs are changed from the distribution capacity cost per kw and the adjustment to class peak measurement for the multi-family class. These adjustments are reflected in columns C and column G. The customer costs include the changes I discussed above. The bad debt costs are incorporated through a percentage adder on overall costs. The exhibit shows that the overall effects on marginal cost-of-service in the residential class are not large. However, costs are moved from the single family class to the multi-family class.

Q22. Can Edison's cost-of-service in the residential class can be allocated according to level of usage.

(a) Yes. Edison agreed to reexamine the potential for cost-justified rates within the residential class as between customers with varying average energy usage. This re-examination for cost-justified rate design changes necessitates analysis of how marginal costs vary by usage within the residential class. Once cost-of-service is segregated by usage level, marginal cost can be compared with revenue recovery for different levels of use to gauge the equity and efficiency of differing rate designs.

I have developed an approach using billing determinants combined with relative costs for single and multi-family customers to quantify cost-of-service by usage. The reasons cost differences between multi-family and single family customers are a good basis for segregating cost-of-service by usage are that multifamily usage is significantly below single family usage and that Edison's load research demonstrates that multifamily customers have significantly higher load factors than single family customers. The different characteristics (between multi family customers and single family customers) are shown in Table 3 below.[13]

TABLE 3
LOAD FACTORS OF SINGLE AND MULTI-FAMILY
NON-SPACE HEAT CUSTOMERS

	Average Energy Used (MW)	Coincident Peak (MW)	Load Factor	Average Usage Per Month
Single-Family	1,638	5,268	31%	640 kWh
Multi-Family	352	656	54%	271 kWh

Q23. **Explain your approach of using Edison's billing frequency distributions to compute cost-of-service by usage level within the residential class?**

(a) Edison billing frequency distributions segregate residential customers according to whether electric space heat is used, whether customers live in multi-family or

[13] In docket 92-0303 Mr. Peter Lazare of the Commission staff criticized use of load factors to describe customer characteristics. I emphasize that my calculations only are based on load factor to the extent that it is used in Edison's cost-of-service study. The actual computations are not based on load factor.

single family homes, and whether customers live inside or outside the City of Chicago. The billing frequency distributions also classify customers according to how much energy is used on a monthly basis (e.g. between 100 kWh and 150 kWh per month).

I have calculated marginal cost-of-service by usage level by using the billing frequency distributions and multiplying the number of billing units (customer bills per month) by the midpoint of the energy usage increment to derive how much total energy is used by customers who use a typical amount of energy per month. For example, in the case of customers who use less than 400 kWh per month and greater than 350 kWh per month, I compute the total energy usage for non-summer months through multiplying the energy midpoint ((350 + 400)/2 = 375 kWh) by the number of non-summer bills. Once the amount of energy in each increment is computed, I calculate the dollar amount of marginal cost for an increment of usage by multiplying the number of bills by the on-going customer cost and by multiplying the total energy usage by the marginal energy and capacity cost per kWh.

Q24. What do the data in Edison's existing cost-of-service study demonstrate with respect to cost-of-service classified according to usage in the residential class?

(a) In City Exhibit (ECB) 3.4, I use Edison's format of comparing marginal cost-of-service with revenue recovery to illustrate different classifications of Edison residential cost-of-service. Lines 1 through 6 of the exhibit show Edison's multi-family, single-family split, lines 7 through 12 show categorization according to the City of Chicago and outside City region and lines 13 through 19 show cost of service by usage level. I separate the residential class into three usage levels -- 300 kWh per month and below, 351-550 kWh per month, and above 550 kWh per month. These usage increments each correspond to approximately one third of Edison's residential customer base. 36% of Edison's non-space heat customers are between 0 and 300 kWh per month, 33% use between 300 and 550 kWh per month and 31% use more than 550 kWh per month.

The third column compares the adjusted cost-of-service with Edison's computations. Line 2 shows that my adjusted non-space heat multi-family costs of service are 82.6% of the cost shown in Edison's study, and lines 13 through 15 show that low-use customers also have lower costs after the adjustments. The revenue recovery and cost-of-service numbers in City Exhibit (ECB) 3.4 reconcile to data in Edison Exhibit 11, Schedule 11.2, page 3.

V. EQUAL PROPORTION OF MARGINAL COST

Q25. Please comment on differences between marginal cost and revenue recovery in the residential class.

A. There are many reasons for differences between Edison's marginal cost and its revenue requirements. Edison's revenue requirements reflect its past decisions, its average costs and the historical cost of its assets. On the other hand, marginal costs take account of economies of scale, the existing physical system, and projected replacement costs. Prices which are efficient and economically optimal from a theoretical standpoint would be set at the marginal cost and not at Edison's revenue requirements. However, for a number of reasons involving economies of scale and regulatory requirements, total revenue requirements are recovered in prices. This means that differences between revenue requirements and marginal cost must be recovered from Edison's customers, but there is no simple and obvious basis to collect the difference.

Allocating differences between revenue requirements and marginal cost using the method of equal proportion of marginal cost is a reasonably equitable way to collect differences between revenue requirements and marginal cost from Edison's

customers. Because of differences in income in the Edison service territory, it is important that this principle be used within the residential class. The Commission has consistently used EPMC as a basis for allocating difference between revenue requirements and marginal cost for purposes of interclass allocation, and similar treatment within the residential class is simply a logical extension of this principle.

Q26. Can the principle of equal proportion of marginal cost be applied within the residential class?

(a) Yes. The notion that rates should be set in proportion to marginal cost applies to intra-class allocation within the residential class as well as inter-class allocation among customer classes. Customers within the residential class are characterized by different income levels, different usage types and different housing stock. The principles impel interclass allocations based on EPMC are also essential considerations for customers within the residential class.

To quantify whether customer groups are being allocated differences between marginal cost and revenue requirements on a proportionate basis, I divide the level of revenue recovery by the level of marginal cost for groups of customers. If the percentage of revenue recovery to marginal cost for a particular customer group is high relative to other customer groups, it is recovering proportionately more

than its marginal costs.

Q27. What are the implications of deviating from equal proportion of marginal cost within the residential class?

(a) Edison has a very large and diverse service territory in terms of residential customers consisting of highly affluent areas and very impoverished areas. Furthermore, there is a strong correlation between the average income of a family and the amount of electricity used. Therefore, if low usage customers pay proportionately more of the difference between Edison's marginal cost and its revenue requirement than high users, the Commission has essentially imposed a extraordinary surcharge on low income residents. In other words, if a rate design results in revenue recovery as a proportion of marginal cost being greater for low use customers than for high use customers, the Commission has, by deviating from EPMC within the residential class, implemented a highly regressive tax.

EXHIBITS TO THE

PREPARED DIRECT TESTIMONY OF

EDWARD C. BODMER

City Exhibit (ECB) 3.1
Schedule 1

COMMONWEALTH EDISON COMPANY
DISTRIBUTION SYSTEM DATA

Line No.		Unit of Measure (A)	City of Chicago (B)	Outside City (C)	Total System (D)	City Percent (E)
1	Overhead Conductors	Miles	13,150	108,057	121,207	10.85%
2	Underground Cable	Miles	4,923	25,290	30,213	16.29%
3	Total	Miles	18,073	133,347	151,420	11.94%
4	Overhead Circut	Miles	5,300	36,200	41,500	12.77%
5	Underground Circut	Miles	4,146	19,243	23,389	17.73%
6	Total	Miles	9,446	55,443	64,889	14.56%
7	Customers	1000	1,115	2,161	3,277	34.03%
8	Sales	GWH	21,514	53,014	74,528	28.87%
9	Peak Load	MW	4,153	11,261	15,414	26.94%
10	Overhead Wire per MW	Miles/MW	3.17	9.60	7.86	
11	Feet per MW	Feet/MW	16,719	50,665	41,519	
12	Underground Wire per MW	Miles/MW	1.19	2.25	1.96	
13	Feet per MW	Feet/MW	6,259	11,858	10,349	
14	Overhead Wire/Customer	Miles/Cust	11.79	49.99	6.27	
15	Overhead Feet	Feet/Cust	62,262	263,957	33,105	
16	Underground Wire/Customer	Miles/Cust	4.41	11.70	9.22	
17	Underground Feet	Feet/Cust	23,309	61,777	48,685	
18	Total Feet/Customer	Feet/Cust	85,572	325,734	81,790	
19	Assumed Overhead per MW	Feet/MW	6,700	23,898	30,598	
20	Assumed Underground per KW	Feet/MW	18,900	6,429	25,329	
21	Assumed Overhead/Cust.	Feet/Cust	24,952	124,506	143,940	
22	Assumed Underground/Cust.	Feet/Cust	70,386	33,492	119,151	
23	Assumed Total/Cust.	Feet/Cust	95,338	157,998	263,091	

COMMONWEALTH EDISON COMPANY
MARGINAL DISTRIBUTION COST OF HEAVY DENSITY CUSTOMERS

Line No.	12 KV MAIN SYSTEM		Edison Measured Costs of Heavy Density: Units (A)	Cost/KW (B)	Quantity (C)	Cost Per KW (D)	Total per KW (E)	Adjusted Costs of Heavy Density: Units (F)	Cost/KW (G)	Quantity (H)	Cost Per KW (I)	Total per KW (J)
1	NORMAL:	Overhead	Feet	0.00355	1,900	6.74		NORMAL: Overhead	Feet	0.00355	7,339	26.05	
2		Direct Burried	Feet	0	0	0.00		Direct Burried	Feet	0	0	0.00	
3		In-duct Burried	Feet	0.02081	10,100	210.18		In-duct Underground	Feet	0.01026	3,161	32.43	
4		Cable Poles	Poles	0.54	1	0.54		Cable Poles	Poles	0.54	1	0.54	
5	RESERVE:	Overhead	Feet	0.00355	1,600	5.68		RESERVE: Overhead	Feet	0.00355	6,180	21.94	
6		Direct Burried	Feet	0	0	0.00		Direct Burried	Feet	0	0	0.00	
7		In-duct Burried	Feet	0.02081	8,300	172.72		In-duct Burried	Feet	0.01026	2,598	26.65	
8		Cable Poles	Poles	0.54	1	0.54	396.41	Cable Poles	Poles	0.54	1	0.54	108.16
	COMMUNITY TAP							COMMUNITY TAP					
	3 PHASE							3 PHASE					
9	NORMAL:	Overhead	Feet	0.01171	1,100	12.88		NORMAL: Overhead	Feet	0.01171	1,100	12.88	
10		Direct Burried	Feet	0	0	0.00		Direct Burried	Feet	0	0	0.00	
11		In-duct Burried	Feet	0.05525	300	16.58		In-duct Burried	Feet	0.0311	300	9.33	
12		Cable Poles	Poles	1.55	0	0.00		Cable Poles	Poles	1.55	0	0.00	
13	RESERVE:	Overhead	Feet	0.01171	800	9.37		RESERVE: Overhead	Feet	0.01171	800	9.37	
14		Direct Burried	Feet	0	0	0.00		Direct Burried	Feet	0	0	0.00	
15		In-duct Burried	Feet	0.05525	200	11.05		In-duct Burried	Feet	0.0311	200	6.22	
16		Cable Poles	Poles	1.55	0	0.00		Cable Poles	Poles	1.55	0	0.00	
17	2 PHASE	Overhead	Feet	0.05257	700	36.80		2 PHASE Overhead	Feet	0.05257	700	36.80	
18	1 PHASE	Overhead	Feet	0.0858	600	51.48	138.15	1 PHASE Overhead	Feet	0.0858	600	51.48	126.08
	SECONDARY 1 PHASE							SECONDARY1 PHASE					
19	NORMAL:	Overhead	Span	11.4667	2	22.93		NORMAL: Overhead	Span	11.4667	2	22.93	
20		Direct Burried	Feet	0.1867	20	3.73		Direct Burried	Feet	0.1867	20	3.73	
21		In-duct Burried	Feet	0.7733	0	0.00	26.67	In-duct Burried	Feet	0.7733	0	0.00	26.67
22	TRANSFORMER		$/KW				32.74	TRANSFORMER	$/KW				32.74
23	TOTAL		$/KW				593.97	TOTAL	$/KW				293.64
	OVERHEAD FEET							OVERHEAD FEET					
24		Primary Main	Feet		3,500			Primary Main	Feet		13,519		
25		Community Tap	Feet		3,200			Community Tap	Feet		3,200		
26		Total	Feet		6,700			Total	Feet		16,719		
	UNDERGROUND FEET							UNDERGROUND FEET					
27		Primary Main	Feet		18,400			Primary Main	Feet		5,759		
28		Community Tap	Feet		500			Community Tap	Feet		500		
29		Total	Feet		18,900			Total	Feet		6,259		

COMMONWEALTH EDISON COMPANY
MARGINAL DISTRIBUTION COST OF MEDIUM DENSITY CUSTOMERS

Line No.	34 KV & DC		Edison Measured Costs of Medium Density: Units (A)	Cost/KW (B)	Quantity (C)	Cost Per KW (D)	Total per KW (E)	Adjusted Costs of Medium Density: Units (F)	Cost/KW (G)	Quantity (H)	Cost Per KW (I)	Total per KW (J)
				FACTOR	20.00%				FACTOR	20.00%		
1	NORMAL:	Overhead	Feet	0.00134	20,600	27.60		Feet	0.00134	20,600	27.60	
2		Direct Burried	Feet	0.0023	0	0.00		Feet	0.0023	0	0.00	
3		In-duct Burried	Feet	0.00497	250	1.24		Feet	0.00497	250	1.24	
4		Cable Poles	Poles	0.97	1	0.97		Poles	0.97	1	0.97	
5	RESERVE:	Overhead	Feet	0.00134	17,300	23.18		Feet	0.00134	17,300	23.18	
6		Direct Burried	Feet	0.0023	0	0.00		Feet	0.0023	0	0.00	
7		In-duct Burried	Feet	0.00497	0	0.00		Feet	0.00497	0	0.00	
8		Cable Poles	Poles	0.97	0	0.00		Poles	0.97	0	0.00	
9	DISTRIBUTION CENTER			42.92	1	42.92	95.92		42.92	1	42.92	95.92
							$19.18					$19.18
	12 KV MAIN SYSTEM											
10	NORMAL:	Overhead	Feet	0.00233	7,300	17.01		Feet	0.00233	23,154	53.95	
11		Direct Burried	Feet	0.00448	1,800	8.06		Feet	0.0023	4,234	9.74	
12		In-duct Burried	Feet	0.01026	1,400	14.36		Feet	0.01026	3,293	33.78	
13		Cable Poles	Poles	0.43	1.3	0.56		Poles	0.43	1.3	0.56	
14	RESERVE:	Overhead	Feet	0.00233	6,000	13.98		Feet	0.00233	19,031	44.34	
15		Direct Burried	Feet	0.00448	500	2.24		Feet	0.0023	1,176	2.70	
16		In-duct Burried	Feet	0.01026	300	3.08		Feet	0.01026	706	7.24	
17		Cable Poles	Poles	0.43	1	0.43	$59.72	Poles	0.43	1	0.43	$152.75
	COMMUNITY TAP											
18	3 PHASE	Overhead	Feet	0.00748	500	3.74		Feet	0.00748	500	3.74	
19		Direct Burried	Feet	0.01	200	2.00		Feet	0.01	200	2.00	
20		In-duct Burried	Feet	0.0311	0	0.00		Feet	0.0311	0	0.00	
21		Cable Poles	Poles	1.55	0.1	0.16		Poles	1.55	0.1	0.16	
22	2 PHASE	Overhead	Feet	0.03263	200	6.53		Feet	0.03263	200	6.53	
23		Direct Burried	Feet	0.03667	200	7.33		Feet	0.03667	200	7.33	
24		In-duct Burried	Feet	0.1452	0	0.00		Feet	0.1452	0	0.00	
25		Cable Poles	Poles	6.38	0	0.00		Poles	6.38	0	0.00	
26	1 PHASE	Overhead	Feet	0.0514	200	10.28		Feet	0.0514	200	10.28	
27		Direct Burried	Feet	0.05333	2,000	106.66		Feet	0.05333	2,000	106.66	
28		In-duct Burried	Feet	0.26753	0	0.00		Feet	0.26753	0	0.00	
29		Cable Poles	Poles	7.48	0.2	1.50	$138.19	Poles	7.48	0.2	1.50	$138.19

COMMONWEALTH EDISON COMPANY
MARGINAL DISTRIBUTION COST OF MEDIUM DENSITY CUSTOMERS

Line No.	SECONDARY		Edison Measured Costs of Medium Density Continued: Units (A)	Cost/KW (B)	Quantity (C)	Cost Per KW (D)	Total per KW (E)	34 KV & DC	Adjusted Costs of Medium Density Continued: Units (F)	Cost/KW (G)	Quantity (H)	Cost Per KW (I)	Total per KW (J)
	NORMAL							NORMAL					
1	1 PHASE	Overhead	Span	28.0000	0	0.00			Span	24.4000	0	0.00	
2		Direct Burried	Feet	0.2800	85	23.80			Feet	0.2800	85	23.80	
3		In-duct Burried	Feet	0.8400	0	0.00	23.80		Feet	0.8400	0	0.00	23.80
4	TRANSFORMER		$/KW				42.60	TRANSFORMER	$/KW				42.6
5	TOTAL		$/KW				$283.50	TOTAL	$/KW				$376.52
	OVERHEAD FEET							OVERHEAD FEET					
6		34 KV			7,580						7,580		
7		Primary Main			13,300						42,185		
8		Community Tap			900						900		
9		Total			21,780						50,665		
	UNDERGROUND FEET							UNDERGROUND FEET					
10		34 KV			50						50		
11		Primary Main			4,000						9,408		
12		Community Tap			2,400						2,400		
13		Total			6,450						11,858		

City Exhibit (ECB) 3.1
Schedule 3

COMMONWEALTH EDISON COMPANY
MARGINAL DISTRIBUTION CAPACITY COSTS

Line No.	Class	Investment cost/KW		General Plant		Annual Revenue Req.		O&M	A&G for O&M	Marginal Distribution Cost/KW	
		Coinc. Portion (A)	Class Peak Portion (B)	Coinc. 1.40% (C)	Class Peak 1.40% (D)	Coinc. 13.39% (E)	Class Peak 13.39% (F)	Class Peak $9.52 (G)	Class Peak 28.70% (H)	Coinc. Portion (I)	Class Peak Portion (J)
1	Residential										
2	1&2 Non. Space	504	67	7.05	0.94	67.58	9.14	9.52	2.73	67.58	21.39
3	1&2 S Heat	550	74	7.70	1.04	73.78	10.05	9.52	2.73	73.78	22.30
4	3+ Non Space	431	86	6.03	1.20	57.87	11.68	9.52	2.73	57.87	23.93
5	3+ Space	488	71	6.83	0.99	65.48	9.64	9.52	2.73	65.48	21.89
6	Rate 6	415	61	5.81	0.85	55.68	8.28	9.52	2.73	55.68	20.53
7	Rate 6L										
8	1-3 MW	370	19	5.18	0.27	50.24	3.24	9.52	2.73	50.24	62.49
9	3-6 MW	252	58	3.53	0.81	34.22	8.24	9.52	2.73	34.22	46.47
10	6-10MW	139	198	1.95	2.77	18.87	26.77	9.52	2.73	18.87	31.12
11	Over 10MW	0	254	0.00	3.56	0.00	34.01	3.21	0.92	0.00	4.13
12	Rate 23&26	349	125	4.89	1.75	47.39	17.39	9.52	2.73	47.39	59.64
13	Rate 25	629	76	8.81	1.06	85.40	11.36	9.52	2.73	85.40	97.65
14	Railroads	125	178	1.75	2.49	16.97	24.07	9.52	2.73	16.97	29.22

City Exhibit (ECB) 3.1
Schedule 4

COMMONWEALTH EDISON COMPANY
CALCULATION OF ASSIGNED DISTRIBUTION CAPACITY COSTS

Line No.	Class	Density Energy MWH (A)	Percent of Total (B)	1993 Coincident Invest Cost/KW (C)	1993 Class Invest Cost/KW (D)	Coincident Weighted Cost/KW (E)	Class Weighted Cost/KW (F)	1994 Coincident Inflation 1.98% (G)	1994 Class Inflation 1.98% (H)
	Residential								
1	Non Space Heat								
2	1&2 Light	252	1.72%	163	898	3	15		
3	1&2 Medium	11,603	79.16%	66	516	52	408		
4	1&2 Heavy	2,801	19.11%	59	366	11	70		
		14,656	100.00%			66	494	67	504
5	Mwh Subtotal								
6	3+ Medium	1,369	43.28%	119	497	52	215		
7	3+ Heavy	1,794	56.72%	57	366	32	208		
8	Mwh Subtotal	3,163	100.00%			84	423	86	431
9	Space Heat								
10	1&2 Light	142	11.96%	112	758	13	91		
11	1&2 Medium	996	84.10%	68	516	57	434		
12	1&2 Heavy	47	3.95%	59	366	2	14		
	Mwh Subtotal	1,184	100.00%			73	539	74	550
13	3+ Medium	1,305	70.02%	78	527	55	369		
14	3+ Heavy	559	29.98%	51	366	15	110		
15	Mwh Subtotal	1,864	100.00%			70	479	71	488

City Exhibit (ECB) 3.1
Schedule 5

ADJUSTED DISTRIBUTION CAPACITY COSTS

Line No.		TDC Cost (A)	Distr Cost (B)	Total (C)	Edison Class Peak (D)	Edison Coincident Peak (E)	Density Adjustment Class (F)	Density Adjustment Coincident (G)	Adjusted Class Peak (H)	Adjusted Coincident Peak (I)
	Residential									
1	Non Space Heat									
2	1&2 Light	144	754	898	163	898	1.00	1.00	163	898
3	1&2 Medium	144	217	361	66	361	1.00	1.43	66	516
4	1&2 Heavy	259	535	794	59	794	1.00	0.46	59	366
5	3+ Medium	144	204	348	119	348	1.00	1.43	119	497
6	3+ Heavy	259	535	794	57	794	1.00	0.46	57	366
7	Space Heat									
8	1&2 Light	144	614	758	112	758	1.00	1.00	112	758
9	1&2 Medium	144	217	361	68	361	1.00	1.43	68	516
10	1&2 Heavy	259	535	794	59	794	1.00	0.46	59	366
11	3+ Medium	144	225	369	78	369	1.00	1.43	78	527
12	3+ Heavy	259	535	794	51	794	1.00	0.46	51	366

City Exhibit (ECB) 3.2
Schedule 1

MARGINAL CUSTOMER RELATED COSTS
ADJUSTED BY CITY OF CHICAGO

	ON-GOING COST OF METERS	ON-GOING COST OF SERVICES	CUSTOMER ACCOUNTING & COLLECTING	TOTAL ON-GOING COSTS	AVERAGE NUMBER OF CUSTOMERS	ON-GOING COST PER CUSTOMER	MONTHLY CUSTOMER COST	NUMBER OF NEW INSTALLATIONS	MARGINAL INSTALLATION COSTS	INSTALLATION COST PER NEW CUSTOMER
	(A)	(B)	(C)	(D) (A)+(B)+(C)	(E)	(F) (D)/(E)	(G) (F)/12	(H)	(I)	
RESIDENTIAL										
RATE 1-NON-SPACE HEAT	12,882,963	41,307,817	98,974,353	153,165,133	1,916,310	$80	$6.67	28,799	12,060,918	$418.80
RATE 1-SPACE HEAT	338,829	1,225,653	2,603,079	4,167,562	50,400	$83	$6.92	110	50,987	$464.93
RATE 1A-NON-SPACE HEAT	6,048,204	2,950,054	46,465,796	55,464,054	899,656	$62	$5.17	9,673	1,099,027	$113.61
RATE 1A-SPACE HEAT	1,011,457	679,690	7,770,606	9,461,754	150,452	$63	$5.25	1,792	240,702	$134.30
SUBTOTAL	20,281,453	46,163,214	155,813,835	222,258,502	3,016,818			40,374	13,451,635	$333.18
COMMERCIAL AND INDUSTRIAL										
RATE 6 (BY SUBCLASS)			15,279,354							
NO DEMAND	1,067,741	1,287,094	8,203,006	10,557,840	158,824			5,829	1,131,934	$194.18
0-25 KW	2,061,580	662,819	4,224,323	6,948,722	81,790			1,442	513,236	$356.00
25-100 KW	1,358,744	911,732	2,057,724	4,328,200	39,841			344	234,392	$680.71
100-400 KW	844,945	1,262,424	646,999	2,754,368	12,527			153	678,372	$4,433.80
SUBTOTAL				24,589,131	292,982	$84	$7.00			
400-800 KW	241,231	248,615	127,417	617,262	2,467			95	448,007	$4,699.37
800-1,000 KW	45,737	38,799	19,885	104,421	385			0	0	$0.00
SUBTOTAL				721,683	2,852	$253	$21.08			
RATE 6L										
1-10 MW	611,195	173,883	84,032	869,110	1,627	$534	$44.50	27	201,303	$7,364.76
OVER 10 MW	41,231	0	2,995	44,226	58	$763	$63.58	0	0	$0.00
STREETLIGHTING										
RATES 23 & 26	0	0	629,473	629,473		$630,993		0	0	
ALL OTHER								0	0	
CHICAGO	0	0	0	0				0	0	
OUTSIDE CHGO -METERED	11,086	146,373	38,688	196,146		$1,117,852		30	6,213	$209.43
-UNMETERED	0	6,511	50,825	57,335				0	0	
WATER/PUMPING	862,135	48,948	41,052	952,135	458	$2,079	$173.25	0	0	$0.00
RAILROADS	23,666	0	681	24,347	63	$386	$32.17	0	0	$0.00
INTERRUPTIBLE										
RATE 6	55,011	4,333	2,221	61,565	43	$1,432	$119.33	0	0	$0.00
RATE 6L								0		
1-10 MW	56,838	3,954	1,911	62,704	37	$1,695	$141.25	0	0	$0.00
OVER 10 MW	11,228	0	311	11,539	6	$1,923	$160.25	0	0	$0.00
TOTAL	27,573,821	50,958,699	171,945,378	250,477,897	3,610,778	$69	$5.75	48,295	16,665,092	

MARGINAL COST OF METERS
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CLASSES	AVERAGE NUMBER OF METERS	MID 1993 COST PER METER	INVESTMENT COST	ESCALATE TO 1/1/94 DOLLARS 1.98%	INVESTMENT INCL. GEN. PLANT FAC 1.014	ANNUAL REVENUE REQUIREMENT 13.97%	O&M EXPENSE FOR METERS	O&M EXP INCL A&G 1.287	END OF LIFE REPLACEMENT 4.19%	TOTAL ON-GOING COST	TOTAL INSTALL COST	COST OF INSTALL PER CUST	NUMBER OF NEW INSTALL	MARG COST TO NEW INSTALL
	(A)	(B)	(C) (A)*(B)	(D) (C)*ESC.	(E) (D)*G.P.	(F) (E)*ALP	(G) (L)*(E)/(K)	(H) (G)*A&G	(K) (E)*FAC	(M)	(N)	(M) (N)/(A)	(O)	(P) (M)*(O)
RESIDENTIAL														
S.F.-NON-SP.HT.	1,916,310	56.92	109,076,365	111,236,077	112,793,382	15,757,236	6,339,727	8,159,229	4,723,734	12,882,963	112,793,382	58.86	28,799	1,695,080
S.F.-SPACE HEAT	50,400	56.92	2,868,768	2,925,570	2,966,528	414,424	166,738	214,592	124,237	338,829	2,966,528	58.86	110	6,455
M.F.-NON-SP.HT.	899,656	56.92	51,208,420	52,222,346	52,953,459	7,397,598	2,976,331	3,830,538	2,217,666	6,048,204	52,953,459	58.86	9,673	569,369
M.F.-SPACE HEAT	150,452	56.92	8,563,728	8,733,290	8,855,556	1,237,121	497,740	640,591	370,866	1,011,457	8,855,556	58.86	1,792	105,496
COMMERCIAL AND IND														
RATE 6 (BY SUBCLASS)														
NO DEMAND	158,824	56.92	9,040,262	9,219,259	9,348,329	1,305,962	525,437	676,237	391,504	1,067,741	9,348,329	58.86	5,829	343,113
0-25 KW	81,790	213.41	17,454,804	17,800,409	18,049,615	2,521,531	1,014,507	1,305,671	755,909	2,061,580	18,049,615	220.68	1,442	318,150
25-100 KW	39,841	288.75	11,504,089	11,731,870	11,896,116	1,661,887	668,640	860,540	498,204	1,358,744	11,896,116	298.59	344	102,814
100-400 KW	12,527	571.08	7,153,919	7,295,567	7,397,705	1,033,459	415,799	535,133	309,812	844,945	7,397,705	590.54	153	90,353
SUBTOTAL														
400-800 KW	2,467	827.9	2,042,429	2,082,869	2,112,030	295,051	118,710	152,780	88,451	241,231	2,112,030	856.11	95	81,616
800-1,000 KW	385	1005.82	387,241	394,908	400,437	55,941	22,507	28,967	16,770	45,737	400,437	1040.10	0	0
SUBTOTAL	295,834													
RATE 6L														
1-10 MW	1,627	3180.59	5,174,820	5,277,281	5,351,163	747,558	300,770	387,091	224,104	611,195	5,351,163	3288.98	27	89,899
OVER 10 MW	58	6018.82	349,092	356,004	360,988	50,430	20,290	26,113	15,118	41,231	360,988	6223.92	0	0
STREETLIGHTING														
RATE 25 (METERED	1,649	56.92	93,861	95,720	97,060	13,559	5,455	7,021	4,065	11,086	97,060	58.86	30	1,746
WATER/PUMPING	2,295	3180.59	7,299,454	7,443,983	7,548,199	1,054,483	424,258	546,020	316,115	862,135	7,548,199	3288.98	0	0
RAILROADS	63	3180.59	200,377	204,345	207,205	28,947	11,646	14,988	8,678	23,666	207,205	3288.98	0	0
INTERRUPTIBLE														
RATE 6	43	1005.82	43,250	44,107	44,724	6,248	2,514	53,138	1,873	55,011	44,724	1040.10	0	0
RATE 6L														
1-10 MW	37	3180.59	117,682	120,012	121,692	17,000	6,840	51,742	5,096	56,838	121,692	3288.98	0	0
OVER 10 MW	6	6018.82	36,113	36,828	37,344	5,217	2,099	9,664	1,564	11,228	37,344	6223.92	0	0
	3,614,264				240,337,770	33,603,651 (K)			10,073,766	27,573,821	240,541,530		0	3,404,092

ESCALATE TO 1994 DOLLARS AT
1989 METER O&M EXPENSE

ACCT 586-METER EXPENSE	11,267,394
ACCT 597-METER MAINT.	1,232,614

MARGINAL COST OF SERVICES
PAGE 155

CLASSES	AVERAGE NUMBER OF SERVICES	COST PER SERVICE 1993 DOLLARS	INVESTMENT COST 1993 DOLLARS	PERCENT OF TOTAL	ESCALATE TO 1/1/94 DOLLARS 2.0%	INVESTMENT INCL. GEN. PLANT FAC 1.014	ANNUAL REVENUE REQUIREMENT 13.42%	O&M AND A&G EXPENSES APPL TO SERVICES	END OF LIFE REPLACEMENT 2.62%	TOTAL ON-GOING COST	TOTAL INSTALL COST	COST OF INSTALL PER CUST	NUMBER OF NEW INSTALL	MARG COST TO NEW INSTALL
	(A)	(B)	(C) (A)*(B)	(D)	(E) (C)*ESC	(F) (E)*G.P.	(G) (F)*ALP	(H) (D)*(J)	(K) (F)*FAC	(M)	(N)	(O) (N)/(A)	(P)	(M)*(O)
RESIDENTIAL														
S.F.-NON-SP.HT.	1,916,310	348.08	667,029,185	84.26%	680,236,363	689,759,672	92,565,748	23,221,262	18,086,555	41,307,817	689,759,672	359.94	28,799	10,365,838
S.F.-SPACE HEAT	50,400	392.69	19,791,576	2.50%	20,183,449	20,466,017	2,746,539	689,003	536,650	1,225,653	20,466,017	406.07	110	44,533
M.F.-NON-SP.HT.	899,656	52.95	47,636,785	6.02%	48,579,993	49,260,113	6,610,707	1,658,378	1,291,676	2,950,054	49,260,113	54.75	9,673	529,657
M.F.-SPACE HEAT	150,452	72.95	10,975,473	1.39%	11,192,787	11,349,486	1,523,101	382,089	297,601	679,690	11,349,486	75.44	1,792	135,206
COMMERCIAL AND INDUSTRIAL														
RATE 6 (BY SUBCLASS)														
NO DEMAND	158,824	130.86	20,783,709	2.63%	21,195,226	21,491,959	2,884,221	723,542	563,552	1,287,094	21,491,959	135.32	5,829	788,822
0-25 KW	81,790	130.86	10,703,039	1.35%	10,914,959	11,067,768	1,485,294	372,605	290,214	662,819	11,067,768	135.32	1,442	195,085
25-100 KW	39,841	369.53	14,722,445	1.86%	15,013,949	15,224,144	2,043,080	512,532	399,200	911,732	15,224,144	382.12	344	131,578
100-400 KW	12,527	3,716.61	46,557,973		47,479,821	48,144,538	6,460,997		1,262,424	1,262,424	48,144,538	3,843.26	153	588,019
SUBTOTAL			92,767,166	100.00%										
400-800 KW	2,467	3,716.61	9,168,877		9,350,421	9,481,327	1,272,394		248,615	248,615	9,481,327	3,843.26	95	366,391
800-1,000 KW	385	3,716.61	1,430,895		1,459,227	1,479,656	198,570		38,799	38,799	1,479,656	3,843.26	0	0
SUBTOTAL														
RATE 6L														
1-10 MW	1,627	3,941.47	6,412,772		6,539,745	6,631,301	889,921		173,883	173,883	6,631,301	4,075.78	27	111,405
OVER 10 MW	58	N/A	0		0	0	0		0	0	0	0.00	0	0
STREETLIGHTING														
CHICAGO	11,000	145.61	1,601,710		1,633,424	1,656,292	222,274		43,431	43,431	1,656,292	150.57	0	0
OUTSIDE CHICAGO														
UNMETERED	37,073	145.61	5,398,200		5,505,084	5,582,155	749,125		146,373	146,373	5,582,155	150.57	30	4,467
METERED	1,649	145.61	240,111		244,865	248,293	33,321		6,511	6,511	248,293	150.57	0	0
WATER/PUMPING	458	3,941.47	1,805,193		1,840,936	1,866,709	250,512		48,948	48,948	1,866,709	4,075.78	0	0
RAILROADS	55	N/A	0		0	0	0		0	0	0	0.00	0	0
INTERRUPTIBLE														
RATE 6	43	3,716.61	159,814		162,978	165,260	22,178		4,333	4,333	165,260	3,843.26	0	0
RATE 6L														
1-10MW	37	3,941.47	145,834		148,722	150,804	20,238		3,954	3,954	150,804	4,075.78	0	0
OVER 10MW	6	N/A	0		0	0	0		0	0	0	0.00	0	0
TOTAL									23,434,430	50,993,841	893,709,430	29,601		13,261,000

City Exhibit (ECB) 3.2
Schedule 4

CUSTOMER ACCOUNTING AND COLLECTING EXPENSE

	METERS PER CUST.	1992 AVG. # OF CUSTOMERS	%	EST. # OF METERS AT 11-30-89	METERS AT 12/92 EXCL.RIDER METERS	SUPERVISION ACCT. 901 AMOUNT	METER READING ACCT. 902 AMOUNT	CUST RECORDS & COL - ACCT AMOUNT	TOTAL ----902 + 903---- AMOUNT	ACCTS. PERCENT	UNCOLLECTIBLE ACCOUNTS ----ACCT AMOUNT	904---- PERCENT	TOTAL IN 1992 DOLLARS	ESCALATE TO 1994 DOLLARS 4.00%	TOTAL INCL. A&G 1.39
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
ANNUAL EXPENSE						$368,861	$22,461,203	$93,187,201			0				
AMOUNT TO ASSIGN						$342,243									
NUMBER OF METERS							3,576,522				33,708,213				
EXPENSE PER METER							$6.28								
				(A)*(B)		*(J)	*(E)	*(C)	(G)+(H)	*(L)	(F)+(G)+(H)+(K)				
RESIDENTIAL															
S.F.-NON-SP.HT.	1.01	1,916,310	57.520%	1,848,213	1,916,310	197,000	12,034,427	53,601,201	65,635,628	57.562%	0	15.16%	65,832,628	71,204,570	98,974,353
S.F.-SPACE HEAT	1.01	50,400	1.513%	50,572	50,400	5,181	316,512	1,409,741	1,726,253	1.514%	0	1.32%	1,731,434	1,872,719	2,603,079
M.F.-NON-SP.HT.	1.01	899,656	27.004%	879,342	899,656	92,486	5,649,840	25,164,322	30,814,162	27.024%	0	46.66%	30,906,648	33,428,630	46,465,796
M.F.-SPACE HEAT	1.01	150,452	4.516%	146,526	150,452	15,467	944,839	4,208,300	5,153,139	4.519%	0	8.62%	5,168,606	5,590,364	7,770,606
TOTAL	1.01														
COMMERCIAL											24,189,014				
RATE 6	1.74	295,834	8.880%	473,992	295,834	30,412	1,857,838	8,274,787	10,132,625	8.886%	0	23.74%	10,163,037	10,992,341	15,279,354
RATE 6L 1-10 MW	5.88	1,627	0.049%	9,085	1,627	167	10,218	45,509	55,727	0.049%	0	3.08%	55,894	60,455	84,032
RATE 6L OVER 10 M	14.33	58	0.002%	888	58	6	364	1,622	1,986	0.002%	0	1.34%	1,992	2,155	2,995
STREET LIGHTING															
RATE 23 & 26		14,924	0.448%	0	0	1,253	0	417,440	417,440	0.366%	0	0.003%	418,693	452,858	629,473
ALL OTHER-METERED		547	0.016%	1,560	1,649	77	10,356	15,300	25,656	0.022%	0	0.003%	25,733	27,833	38,688
-UNMETERED		1,205	0.036%	0	0	101	0	33,705	33,705	0.030%	0	0.003%	33,806	36,565	50,825
WATER/SEWER PUMPING	5.01	458	0.014%	2,320	2,295	82	14,413	12,811	27,224	0.024%	0	0.00%	27,306	29,534	41,052
RAILROADS	31.5	2	0.000%	63	63	1	396	56	452	0.000%	0	0.07%	453	490	681
INTERRUPTIBLE															
RATE 6	1.74	43	0.001%	90	43	4	270	1,203	1,473	0.001%			1,477	1,598	2,221
RATE 6L															
1-10 MW	5.88	37	0.001%	206	37	4	232	1,035	1,267	0.001%			1,271	1,375	1,911
OVER 10 MW	14.33	6	0.000%	115	6	1	38	168	206	0.000%			207	224	311
TOTAL		3,331,559	100.00%	3,412,972	3,318,430	342,242	20,839,740	93,187,200	114,026,943	100.00%	24,189,014	100.00%	114,369,185	123,701,710	171,945,3??

City Exhibit (ECB) 3.2
Schedule 5

NEW CUSTOMERS

	1990 NUMBER OF METERS (A)	1993 NUMBER OF METERS (B)	1990-1993 INCREASE (C)	AVERAGE ANNUAL INCREASE (D)
RESIDENTIAL				
RATE 1-NON-SPACE HEAT	1,829,914	1,916,310	86,396	28,799
RATE 1-SPACE HEAT	50,071	50,400	329	110
RATE 1A-NON-SPACE HEAT	870,636	899,656	29,020	9,673
RATE 1A-SPACE HEAT	145,075	150,452	5,377	1,792
SUBTOTAL				
COMMERCIAL AND INDUSTRIAL				
RATE 6 (BY SUBCLASS)				
NO DEMAND	141,336	158,824	17,488	5,829
0-25 KW	77,465	81,790	4,325	1,442
25-100 KW	38,808	39,841	1,033	344
100-400 KW	12,068	12,527	459	153
SUBTOTAL				
400-800 KW	2,181	2,467	286	95
800-1,000 KW	551	385	(166)	0
SUBTOTAL				
RATE 6L				
1-10 MW	1,545	1,627	82	27
OVER 10 MW	62	58	(4)	0
STREETLIGHTING				
RATES 23 & 26		0	0	0
ALL OTHER		0	0	0
CHICAGO		0	0	0
OUTSIDE CHGO -METERED	1,560	1,649	89	30
-UNMETERED		0	0	0
WATER/PUMPING	2,320	2,295	(25)	0
RAILROADS	63	63	0	0
INTERRUPTIBLE				
RATE 6				
RATE 6L				
1-10 MW				
OVER 10 MW				
TOTAL	3,173,655	3,318,344	144,689	48,295

City Exhibit (ECB) 3.2
Schedule 6

MARGINAL COST OF REPLACING METERS AND SERVICES

Service Drop Replacement

Service Life	40	Years
Assumed Remaining Life	20	Years
Nominal Rate	10.59%	
Inflation	4.00%	
Real Rate	6.33%	

Year	Equipment Cost (A)	PV of Replacement (B)	Annual Fund (C)
1			2.62
2			2.62
3			2.62
4			2.62
5			2.62
6			2.62
7			2.62
8			2.62
9			2.62
10			2.62
11			2.62
12			2.62
13			2.62
14			2.62
15			2.62
16			2.62
17			2.62
18			2.62
19			2.62
20	100.00	29.28	2.62
			29.28

Meter Replacement

Service Life	30	Years
Assumed Remaining Life	15	Years
Nominal Rate	10.59%	
Inflation	4.00%	
Real Rate	6.33%	

Year	Equipment Cost (A)	PV of Replacement (B)	Annual Fund (C)
1			4.19
2			4.19
3			4.19
4			4.19
5			4.19
6			4.19
7			4.19
8			4.19
9			4.19
10			4.19
11			4.19
12			4.19
13			4.19
14			4.19
15	100.00	39.80	4.19
			39.80

COMMONWEALTH EDISON COMPANY

MARGINAL COST-OF-SERVICE FOR RESIDENTIAL CUSTOMERS

BAD DEBT COST	24,189
CUSTOMER COST	36,744
CAP & ENERGY	1,548,658
INSTALLATION	13,451
TOTAL	1,598,853
BAD DEBT PERCENT	1.513%

Line No.	1994 MARGINAL COSTS	LOSS AS % OF GEN-ERATION (A)	BULK POWER PER KW (B)	TRANS. & DIST. PER KW (C)	TOTAL PER KW (D)	COINC-IDENT SOLD MW (E)	CLASS T&D COST PER KW (F)	CLASS PEAK SOLD MW (G)	CLASS CAPACITY COST (H)	SEASONAL CAPACITY COST (I)	SEASONAL MWH (J)	COST PER SEASONAL KWH (K)	ENERGY COST	TOTAL PER KWH	ON-GOING CUSTOMER COST	TOTAL W/ BAD DEBT ADDER 1.51%	CUST COST W/ ADDER 1.51%
1	Production Cots Per KW		$81							80.00%							
2	Bulk Power Transmission Cost/KW		$18							20.00%							
3			$99														
4	Single - No Space Heat	11.82%	112	68	180	5,268.7	21	5,854.1	1,071,301	857,041	5,345,760	16.03	1.17	17.20	6.67	17.462	6.77
5										214,260	9,004,940	2.38	1.38	3.76		3.816	
6	Single - Space Heat	11.82%	112	74	186	150.0	22	166.7	31,567	25,253	240,769	10.49	1.17	11.66	6.92	11.835	7.02
7										6,313	1,015,102	0.62	1.38	2.00		2.032	
8	Multi - No Space Heat	11.86%	112	58	170	655.8	24	728.7	128,974	103,179	1,143,037	9.03	1.24	10.27	5.17	10.422	5.25
9								802.3		25,795	1,943,737	1.33	1.49	2.82		2.860	
10	Multi - Space Heat	11.86%	112	65	177	212.5	22	236.1	42,807	34,246	374,800	9.14	1.24	10.38	5.25	10.534	5.33
11										8,561	1,515,952	0.56	1.49	2.05		2.086	
12	2002 MARGINAL COSTS																
13																	
14	Production Cots Per KW		$95							95.00%							
15	Bulk Power Transmission Cost/KW		$18							5.00%							
16			$113														
17	Single - No Space Heat	11.82%	128	68	196	5,268.7	21	5,854.1	1,155,600	1,097,820	5,345,760	20.54	1.35	21.89	6.67	22.217	6.77
18										57,780	9,004,940	0.64	1.64	2.28		2.316	
19	Single - Space Heat	11.82%	128	74	202	150.0	22	166.7	33,967	32,268	240,769	13.40	1.35	14.75	6.92	14.975	7.02
20										1,698	1,015,102	0.17	1.64	1.81		1.835	
21	Multi - No Space Heat	11.86%	128	58	186	655.8	24	728.7	139,467	132,493	1,143,037	11.59	1.42	13.01	5.17	13.208	5.25
22										6,973	1,943,737	0.36	1.77	2.13		2.161	
23	Multi - Space Heat	11.86%	128	65	193	212.5	22	236.1	46,207	43,897	374,800	11.71	1.42	13.13	5.25	13.331	5.33
24										2,310	1,515,952	0.15	1.77	1.92		1.951	

City Exhibit (ECB) 3.4

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT CURRENT RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS: EDISON 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED AS % OF EDISON	CURRENT RATES: REVENUE RECOVERY	CURRENT RATES: REVENUE AS A PERCENT OF EDISON COST	CURRENT RATES: REVENUE AS A PERCENT OF ADJUSTED COST
	EDISON CATEGORIES						
1	Single No-Space Heat	1,471,622,000	1,429,999,888	97.17%	1,518,552,735	103.19%	106.19%
2	Multi No-Space Heat	279,700,000	231,020,497	82.60%	343,363,634	122.76%	148.63%
3	Single Space Heat	53,206,030	53,367,524	100.30%	81,972,448	154.07%	153.60%
4	Multi Space Heat	87,238,318	80,727,111	92.54%	136,110,607	156.02%	168.61%
5	Installation Costs	0	13,451,635	NA	0		
6	TOTAL	1,891,766,348	1,808,566,656	95.60%	2,079,999,423	109.95%	115.01%
	CITY OF CHICAGO VS OUTSIDE CITY						
	Non Space Heat:						
7	Inside City	439,035,946	399,237,847	90.94%	502,482,349	114.45%	125.86%
8	Outside City	1,312,286,054	1,261,782,538	96.15%	1,359,434,019	103.59%	107.74%
9	Total Non Space Heat	1,751,322,000	1,661,020,385	94.84%	1,861,916,368	106.31%	112.09%
	Space Heat:						
10	Inside City	25,828,573	24,070,694	93.19%	41,369,916	160.17%	171.87%
11	Outside City	114,615,776	110,023,941	95.99%	176,713,139	154.18%	160.61%
12	Total Space Heat	140,444,348	134,094,636	95.48%	218,083,055	155.28%	162.63%
	COST-OF-SERVICE BY USAGE LEVEL						
	Non Space Heat:						
13	Low Use <= 300	314,365,952	266,117,073	84.65%	365,095,009	116.14%	137.19%
14	Moderate Use 351-550	435,890,705	402,991,098	92.45%	529,737,930	121.53%	131.45%
15	High Use > 550	1,001,065,343	991,912,214	99.09%	967,083,430	96.61%	97.50%
16	Total Non-Space	1,751,322,000	1,661,020,385	94.84%	1,861,916,368	106.31%	112.09%
17	Total Space	140,444,348	134,094,636	95.48%	218,083,055	155.28%	162.63%
18	Installation Costs	0	13,451,635	NA	0		
19	TOTAL RESIDENTIAL	1,891,766,348	1,808,566,656	95.60%	2,079,999,423	109.95%	115.01%

City Exhibit (ECB) 3.4
Schedule 2

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT CURRENT RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS: EDISON 2002 MARGINAL COST	MARGINAL COSTS: ADJUSTED 2002 MARGINAL COST	MARGINAL COSTS: ADJUSTED AS % OF EDISON	CURRENT RATES: REVENUE RECOVERY	CURRENT RATES: REVENUE AS A PERCENT OF EDISON COST	CURRENT RATES: REVENUE AS A PERCENT OF ADJUSTED COS
	EDISON CATEGORIES						
1	Single No-Space Heat	1,581,443,233	1,541,572,806	97.48%	1,518,552,735	96.02%	98.51%
2	Multi No-Space Heat	297,449,636	248,940,516	83.69%	343,363,634	115.44%	137.93%
3	Single Space Heat	54,093,869	50,018,239	92.47%	81,972,448	151.54%	163.89%
4	Multi Space Heat	92,206,660	78,292,073	84.91%	136,110,607	147.61%	173.85%
5	Installation Costs	0	13,451,635	NA	0		
6	TOTAL	2,025,193,398	1,932,275,270	95.41%	2,079,999,423	102.71%	107.65%
	CITY OF CHICAGO VS OUTSIDE CITY						
	Non Space Heat:						
7	Inside City	472,925,102	432,431,916	91.44%	502,482,349	106.25%	116.20%
8	Outside City	1,405,967,767	1,358,081,406	96.59%	1,359,434,019	96.69%	100.10%
9	Total Non Space Heat	1,878,892,869	1,790,513,322	95.30%	1,861,916,368	99.10%	103.99%
	Space Heat:						
10	Inside City	27,231,851	23,283,903	85.50%	41,369,916	151.92%	177.68%
11	Outside City	119,068,678	105,026,410	88.21%	176,713,139	148.41%	168.26%
12	Total Space Heat	146,300,529	128,310,313	87.70%	218,083,055	149.07%	169.97%
	COST-OF-SERVICE BY USAGE LEVEL						
	Non Space Heat:						
13	Low Use <= 300	317,386,683	270,380,478	85.19%	365,095,009	115.03%	135.03%
14	Moderate Use 351-550	450,147,602	416,771,173	92.59%	529,737,930	117.68%	127.11%
15	High Use > 550	1,111,358,583	1,103,361,671	99.28%	967,083,430	87.02%	87.65%
16	Total Non-Space	1,878,892,869	1,790,513,322	95.30%	1,861,916,368	99.10%	103.99%
17	Total Space	146,300,529	128,310,313	87.70%	218,083,055	149.07%	169.97%
18	Installation Costs	0	13,451,635	NA	0		
19	TOTAL RESIDENTIAL	2,025,193,398	1,932,275,270	95.41%	2,079,999,423	102.71%	107.65%

City Exhibit (ECB) 3.5

Schedule 1

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT PROPOSED RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS: EDISON 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED AS % OF EDISON	PROPOSED RATES: REVENUE RECOVERY	PROPOSED RATES: REVENUE AS A PERCENT OF EDISON COST	PROPOSED RATES: REVENUE AS A PERCENT OF ADJUSTED COST
	EDISON CATEGORIES						
1	Single No-Space Heat	1,471,622,000	1,429,999,888	97.17%	1,674,913,666	113.81%	117.13%
2	Multi No-Space Heat	279,700,000	231,020,497	82.60%	374,780,776	133.99%	162.23%
3	Single Space Heat	53,206,030	53,367,524	100.30%	88,791,689	166.88%	166.38%
4	Multi Space Heat	87,238,318	80,727,111	92.54%	149,178,836	171.00%	184.79%
5	Installation Costs	0	13,451,635	NA	0		
6	TOTAL	1,891,766,348	1,808,566,656	95.60%	2,287,664,967	120.93%	126.49%
	CITY OF CHICAGO VS OUTSIDE CITY						
	Non Space Heat:						
7	Inside City	439,035,946	399,237,847	90.94%	549,261,636	125.11%	137.58%
8	Outside City	1,312,286,054	1,261,782,538	96.15%	1,500,432,806	114.34%	118.91%
9	Total Non Space Heat	1,751,322,000	1,661,020,385	94.84%	2,049,694,442	117.04%	123.40%
	Space Heat:						
10	Inside City	25,828,573	24,070,694	93.19%	44,088,936	170.70%	183.16%
11	Outside City	114,615,776	110,023,941	95.99%	193,881,589	169.16%	176.22%
12	Total Space Heat	140,444,348	134,094,636	95.48%	237,970,525	169.44%	177.46%
	COST-OF-SERVICE BY USAGE LEVEL						
	Non Space Heat:						
13	Low Use <= 300	314,365,952	266,117,073	84.65%	389,941,259	124.04%	146.53%
14	Moderate Use 351-550	435,890,705	402,991,098	92.45%	573,012,086	131.46%	142.19%
15	High Use > 550	1,001,065,343	991,912,214	99.09%	1,086,741,097	108.56%	109.56%
16	Total Non-Space	1,751,322,000	1,661,020,385	94.84%	2,049,694,442	117.04%	123.40%
17	Total Space	140,444,348	134,094,636	95.48%	237,970,525	169.44%	177.46%
18	Installation Costs	0	13,451,635	NA	0		
19	TOTAL RESIDENTIAL	1,891,766,348	1,808,566,656	95.60%	2,287,664,967	120.93%	126.49%

City Exhibit (ECB) 3.5
Schedule 2

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT EDISON PROPOSED RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS			PROPOSED RATES		
		EDISON 2002 MARGINAL COST	ADJUSTED 2002 MARGINAL COST	ADJUSTED AS % OF EDISON	REVENUE RECOVERY	REVENUE AS A PERCENT OF EDISON COST	REVENUE AS A PERCENT OF ADJUSTED COS
	EDISON CATEGORIES						
1	Single No-Space Heat	1,581,443,233	1,541,572,806	97.48%	1,674,913,666	105.91%	108.65%
2	Multi No-Space Heat	297,449,636	248,940,516	83.69%	374,780,776	126.00%	150.55%
3	Single Space Heat	54,093,869	50,018,239	92.47%	88,791,689	164.14%	177.52%
4	Multi Space Heat	92,206,660	78,292,073	84.91%	149,178,836	161.79%	190.54%
5	Installation Costs	0	13,451,635	NA	0		
6	TOTAL	2,025,193,398	1,932,275,270	95.41%	2,287,664,967	112.96%	118.39%
	CITY OF CHICAGO VS OUTSIDE CITY						
	Non Space Heat:						
7	Inside City	472,925,102	432,431,916	91.44%	549,261,636	116.14%	127.02%
8	Outside City	1,405,967,767	1,358,081,406	96.59%	1,500,432,806	106.72%	110.48%
9	Total Non Space Heat	1,878,892,869	1,790,513,322	95.30%	2,049,694,442	109.09%	114.48%
	Space Heat:						
10	Inside City	27,231,851	23,283,903	85.50%	44,088,936	161.90%	189.35%
11	Outside City	119,068,678	105,026,410	88.21%	193,881,589	162.83%	184.60%
12	Total Space Heat	146,300,529	128,310,313	87.70%	237,970,525	162.66%	185.46%
	COST-OF-SERVICE BY USAGE LEVEL						
	Non Space Heat:						
13	Low Use <= 300	317,386,683	270,380,478	85.19%	389,941,259	122.86%	144.22%
14	Moderate Use 351-550	450,147,602	416,771,173	92.59%	573,012,086	127.29%	137.49%
15	High Use > 550	1,111,358,583	1,103,361,671	99.28%	1,086,741,097	97.78%	98.49%
16	Total Non-Space	1,878,892,869	1,790,513,322	95.30%	2,049,694,442	109.09%	114.48%
17	Total Space	146,300,529	128,310,313	87.70%	237,970,525	162.66%	185.46%
18	Installation Costs	0	13,451,635	NA	0		
19	TOTAL RESIDENTIAL	2,025,193,398	1,932,275,270	95.41%	2,287,664,967	112.96%	118.39%

City Exhibit (ECB) 3.6
Schedule 1

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT CITY PROPOSED RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS: EDISON 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED 1994 MARGINAL COST	MARGINAL COSTS: ADJUSTED AS % OF EDISON	CITY PROPOSED RATES: REVENUE RECOVERY	CITY PROPOSED RATES: REVENUE AS A PERCENT OF EDISON COST	CITY PROPOSED RATES: REVENUE AS A PERCENT OF ADJUSTED COST	CITY PROPOSED RATES: PERCENT INCREASE
	EDISON CATEGORIES							
1	Single No-Space Heat	1,471,622,000	1,429,999,888	97.17%	1,711,932,857	116.33%	119.72%	12.73%
2	Multi No-Space Heat	279,700,000	231,020,497	82.60%	318,993,801	114.05%	138.08%	-7.10%
3	Single Space Heat	53,206,030	53,367,524	100.30%	88,791,689	166.88%	166.38%	8.32%
4	Multi Space Heat	87,238,318	80,727,111	92.54%	149,178,836	171.00%	184.79%	9.60%
5	Installation Costs	0	13,451,635	NA	18,831,400			
6	TOTAL	1,891,766,348	1,808,566,656	95.60%	2,287,728,583	120.93%	126.49%	9.99%
	CITY OF CHICAGO VS OUTSIDE CITY							
	Non Space Heat:							
7	Inside City	439,035,946	399,237,847	90.94%	513,219,253	116.90%	128.55%	2.14%
8	Outside City	1,312,286,054	1,261,782,538	96.15%	1,517,707,405	115.65%	120.28%	11.64%
9	Total Non Space Heat	1,751,322,000	1,661,020,385	94.84%	2,030,926,658	115.97%	122.27%	9.08%
	Space Heat:							
10	Inside City	25,828,573	24,070,694	93.19%	44,088,936	170.70%	183.16%	6.57%
11	Outside City	114,615,776	110,023,941	95.99%	193,881,589	169.16%	176.22%	9.72%
12	Total Space Heat	140,444,348	134,094,636	95.48%	237,970,525	169.44%	177.46%	9.12%
	COST-OF-SERVICE BY USAGE LEVEL							
	Non Space Heat:							
13	Low Use <= 300	314,365,952	266,117,073	84.65%	329,615,974	104.85%	123.86%	-9.72%
14	Moderate Use 351-550	435,890,705	402,991,098	92.45%	533,943,124	122.49%	132.50%	0.79%
15	High Use > 550	1,001,065,343	991,912,214	99.09%	1,167,367,560	116.61%	117.69%	20.71%
16	Total Non-Space	1,751,322,000	1,661,020,385	94.84%	2,030,926,658	115.97%	122.27%	9.08%
17	Total Space	140,444,348	134,094,636	95.48%	237,970,525	169.44%	177.46%	9.12%
18	Installation Costs	0	13,451,635	NA	18,831,400			
19	TOTAL RESIDENTIAL	1,891,766,348	1,808,566,656	95.60%	2,287,728,583	120.93%	126.49%	9.99%

City Exhibit (ECB) 3.6
Schedule 3

COMMONWEALTH EDISON COMPANY
RESIDENTIAL MARGINAL COST RECOVERIES AT CITY PROPOSED RATES

Line No.	RESIDENTIAL CATEGORIES	MARGINAL COSTS			PROPOSED RATES			
		EDISON 2002 MARGINAL COST	ADJUSTED 2002 MARGINAL COST	ADJUSTED AS % OF EDISON	REVENUE RECOVERY	REVENUE AS A PERCENT OF EDISON COST	REVENUE AS A PERCENT OF ADJUSTED COST	PERCENT INCREASE
	EDISON CATEGORIES							
1	Single No-Space Heat	1,581,443,233	1,541,572,806	97.48%	1,711,932,857	108.25%	111.05%	12.73%
2	Multi No-Space Heat	297,449,636	248,940,516	83.69%	319,827,671	107.52%	128.48%	-6.85%
3	Single Space Heat	54,093,869	50,018,239	92.47%	88,791,689	164.14%	177.52%	8.32%
4	Multi Space Heat	92,206,660	78,292,073	84.91%	149,178,836	161.79%	190.54%	9.60%
5	Installation Costs	0	13,451,635	NA	18,831,400			
6	TOTAL	2,025,193,398	1,932,275,270	95.41%	2,288,562,452	113.00%	118.44%	10.03%
	CITY OF CHICAGO VS OUTSIDE CITY							
	Non Space Heat:							
7	Inside City	472,925,102	432,431,916	91.44%	513,599,237	108.60%	118.77%	2.21%
8	Outside City	1,405,967,767	1,358,081,406	96.59%	1,518,161,290	107.98%	111.79%	11.68%
9	Total Non Space Heat	1,878,892,869	1,790,513,322	95.30%	2,031,760,527	108.14%	113.47%	9.12%
	Space Heat:							
10	Inside City	27,231,851	23,283,903	85.50%	44,088,936	161.90%	189.35%	6.57%
11	Outside City	119,068,678	105,026,410	88.21%	193,881,589	162.83%	184.60%	9.72%
12	Total Space Heat	146,300,529	128,310,313	87.70%	237,970,525	162.66%	185.46%	9.12%
	COST-OF-SERVICE BY USAGE LEVEL							
	Non Space Heat:							
13	Low Use <= 300	317,386,683	270,380,478	85.19%	329,615,974	103.85%	121.91%	-9.72%
14	Moderate Use 351-550	450,147,602	416,771,173	92.59%	534,144,786	118.66%	128.16%	0.83%
15	High Use > 550	1,111,358,583	1,103,361,671	99.28%	1,167,999,767	105.10%	105.86%	20.78%
16	Total Non-Space	1,878,892,869	1,790,513,322	95.30%	2,031,760,527	108.14%	113.47%	9.12%
17	Total Space	146,300,529	128,310,313	87.70%	237,970,525	162.66%	185.46%	9.12%
18	Installation Costs	0	13,451,635	NA	18,831,400			
19	TOTAL RESIDENTIAL	2,025,193,398	1,932,275,270	95.41%	2,288,562,452	113.00%	118.44%	

City Exhibit (ECB) 3.7
Schedule 1

COMMONWEALTH EDISON COMPANY
BILL IMPACTS OF CITY PROPOSAL

Monthly kWh Block Ending	Cumulative Bills Percent	CURRENT RATES		PROPOSED RATES			CITY PROPOSED RATES		
		Wtd Avg Bill	Avg. Cents per kWh	Wtd Avg Bill	Avg. Cents per kWh	Percent Increase	Wtd Avg Bill	Avg. Cents per kWh	Percent Increase
50	2.42%	10.15	20.31	10.97	21.94	8.04%	8.31	16.62	-18.15%
75	3.70%	12.70	16.94	13.71	18.28	7.96%	10.72	14.29	-15.61%
100	5.68%	15.75	15.75	17.00	17.00	7.99%	13.96	13.96	-11.35%
150	11.71%	20.84	13.89	22.49	14.99	7.91%	18.77	12.52	-9.92%
200	19.55%	26.04	13.02	28.08	14.04	7.87%	23.75	11.88	-8.76%
250	27.92%	31.53	12.61	34.01	13.60	7.87%	29.24	11.69	-7.27%
300	36.15%	36.82	12.27	39.71	13.24	7.85%	34.38	11.46	-6.62%
350	43.93%	42.02	12.00	45.31	12.94	7.83%	39.36	11.25	-6.31%
400	50.98%	47.31	11.83	51.01	12.75	7.82%	44.51	11.13	-5.91%
450	57.48%	51.27	11.39	55.87	12.42	8.97%	50.50	11.22	-1.49%
500	63.39%	55.23	11.05	60.73	12.15	9.96%	56.50	11.30	2.29%
550	68.69%	59.04	10.74	65.43	11.90	10.81%	62.24	11.32	5.42%
600	73.38%	62.90	10.48	70.18	11.70	11.56%	68.07	11.34	8.21%
650	77.46%	66.72	10.26	74.87	11.52	12.22%	73.81	11.36	10.63%
700	80.98%	70.58	10.08	79.62	11.37	12.81%	79.64	11.38	12.84%
750	83.96%	74.39	9.92	84.32	11.24	13.35%	85.38	11.38	14.77%
800	86.48%	78.25	9.78	89.07	11.13	13.82%	91.21	11.40	16.56%
850	88.60%	82.11	9.66	93.82	11.04	14.25%	97.03	11.42	18.17%
900	90.37%	85.92	9.55	98.51	10.95	14.65%	102.77	11.42	19.61%
950	91.85%	89.64	9.44	103.10	10.85	15.02%	108.35	11.41	20.88%
1000	93.07%	93.35	9.33	107.68	10.77	15.36%	113.93	11.39	22.05%
1100	94.93%	100.77	9.16	116.85	10.62	15.96%	125.08	11.37	24.12%
1200	96.22%	108.20	9.02	126.02	10.50	16.48%	136.23	11.35	25.91%
1300	97.13%	115.62	8.89	135.20	10.40	16.93%	147.39	11.34	27.47%
1400	97.78%	123.05	8.79	144.37	10.31	17.32%	158.54	11.32	28.85%
1500	98.26%	130.47	8.70	153.54	10.24	17.68%	169.69	11.31	30.06%

Rate Impacts of Edison Proposal and City Proposal
Exhibit ECB-7, Schedule 2